B L I S T E R R U S T W O R K

I N T H E F A R W E S T

January 1 to December 31, 1933

Spokane Branch
Division of Blister Rust Control
618 Realty Bldg.
Spokane, Washington

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BLISTER RUST WORK IN THE FAR WEST

January 1 to December 31, 1933

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The calendar year of 1933 was marked by a material increase in the scope of western blister rust control operations, notably in north Idaho. This increase was due to the assignment of considerable numbers of Civilian Conservation Corps men to blister rust control work, and the allotment of funds to this Division and to the Forest service from Public Works allotments for such work.

In accordance with the general policy of the Bureau of Plant Industry, the Division of Blister Rust Control accepted technical responsibility for all blister rust control operations in the West. In order to meet this technical responsibility in the materially expanded program, the personnel and organization resources of the Western Branch of this Division were strained to the utmost. It can be said, however, that the responsibility was met successfully. The job of technically organizing the work of about 8,000 men at the time when this large project was first going into the field, was no light one. Also, this assignment called for the supervision of men for the most part entirely unfamiliar with woods work and life. At the beginning of the season working efficiency was very low, but gradually improved.

During the latter part of August word was received that additional funds would be allotted to western blister rust control work by the Public Works Administration. This called for a further and very sudden expansion of the field operations. Camps were placed in the field in a short time, however, and good use was made of the additional men during the latter part of the season. The details of these operations will be found in the body of the report.

As in 1932, the lumber companies and the timber protective associations of north Idaho were forced to either discontinue or materially decrease their cooperative blister rust control work. The place of these previous cooperative operations was, however, largely taken by the location of CCC and NIRA camps upon state and private lands.

During the course of the 1933 field season, the rust was found to be further intensifying itself over all of that portion of the white pine belt from the Coeur d'Alene National Forest southward. Thirteen additional pine infection centers were discovered. Ribes infection was almost ubiquitous, and could be found in almost any general locality of the white pine belt from the Coeur d'Alene National Forest southward, in which a determined search was made.

With the major emphasis of the year being placed on large scale control operations, and with a sharp limiting of funds for other purposes the experimental projects were in no way expanded. The work of the chemical investigations unit was maintained at Berkeley, Moscow and in the field. During the field season further experiments were conducted on methods of Ribes eradication and further investigations were made in Ribes ecology.

During the calendar year 1933 the Western Branch of the Division of Blister Rust Control operated upon the basis of funds available from two fiscal years as follows:

For the period January 1, 1933 to June 30, 1933 the applicable appropriation was "33133.14, Salaries and Expenses, Bureau of Plant Industry, Blister Rust Control, 1933", of which the amount allotted to the Western Division was $208,000 (for the entire fiscal year). In addition, $1,500 from the available appropriation "33133.25, Salaries and Expenses, Bureau of Plant Industry, Blister Rust Control, 1933", was allotted to this Division for the entire fiscal year for experimental work in the eradication of barberry by chemicals. The total amount of $209,500.00 was allotted as follows:

Project		For the Period 7/1/32-6/30/33
A. Delaying spread of blister rust.		
1. Field surveys in Northwestern States to determine location of dangerous centers of infection and to follow the natural advance and establishment of blister rust in the northern area.		$13,283.52
2. Field Surveys in Oregon.		2,587.58
3. Field surveys in California.		5,554.10
B. Development of application of local control.		
1. Federal lands in Washington, Idaho and northwestern Montana.		43,534.52
2. Local control on state and private lands in Idaho, two dollars for one dollar cooperation between Federal Government and timber owners.		35,319.78
3. Studies of local control and its costs, California		5,302.45
4. Control reconnaissance and Ribes survey, sugar pine areas of California.		9,283.37
C. Investigative work, Division of Forest Pathology.		9,100.00
D. Experimental work on chemical eradication of Ribes and barberry and ecological studies.		21,437.34
E. Educational work.		2,818.14
F. Summarization of field data.		1,750.00
G. Field supervision, maintenance of Spokane office, miscellaneous supplies.		23,298.07
H. Miscellaneous allotments		
1. General Control.	$22,492.00	
2. Mycology.	572.00	
3. Bureau of reserve.	2,080.00	
4. Department reserve.	156.00	
5. Reserve for impounded balances.	10,931.13	36,231.13
Total.		$209,500.00

For the period July 1, 1933 to December 31, 1933, the applicable appropriation was "34133.14, Salaries and Expenses, Bureau of Plant Industry, Blister Rust Control, 1934", of which the amount allotted to the Western Division was $96,500.00. During this period no allotments were made to project activities.

On August 10, 1933, the Public Works Administration made the following allotments of funds for White Pine Blister Rust Control in the West under the appropriation "3.03/5640.10.4 National Industrial Recovery, Agriculture, Bureau of Plant Industry, White Pine Blister Rust Control 1933-1935":

FP209-Idaho	$500,000
FP210-Montana	90,000
FP211-Washington	112,000
FP212-California	400,000
FP213-Oregon	50,000
FP214-Wyoming	10,000
FP215-Colorado	10,000
Total	$1,172,000

On August 31, 1933, there was allotted to this Division an additional amount of $50,000 under the appropriation "3-03/5640.10.1 National Industrial Recovery, Agriculture, Bureau of Plant Industry, Physical Improvements, 1933-1935" for FP128-Oregon.

During the 1933 calendar year, H. E. Swanson was placed in charge of all checking of Ribes eradication work. W. V. Benedict and his California men were headquartered at Oakland, California, where they obtained office space in one of the government buildings on Government Island. Otherwise the location and arrangements of personnel remained the same as in 1932. The following is the permanent western personnel who were employed during the period covered by the report:

1. Supervisory:

   a. In Charge of Western Branch Office, S. N. Wyckoff, Senior Pathologist.

2. Project Leaders:

   a. Ribes Ecological Studies, C. W. Waters, Agent, full time summer months, w.a.e., during the winter period.

   b. Development of Mechanical Methods of Ribes Eradication. *C. C. Strong, Associate Forester, assisted by J. F. Breakey, Agent.

   c. Cooperative Local Control, Idaho. *C. C. Strong, Associate Forester, assisted by B. A. Anderson, W. G. Guernsey and H. J. Hartmen, Junior Foresters; F. O. Walters, L. L. White, N. D. Nelson, F. J. Heinrich, M. C. Riley, S. E. McLaughlin, M. D. Oaks, and D. F. Williams.

   d. Checking and Methods of Ribes Eradication. H. E. Swanson, Agent, assiste by H. A. Brischle, H. J. Faulkner, V. D. Moss, W. F. Painter, and A. L. Pence

*For the purpose of coordination and standardization of the various eradication projects (b, c, and e) in the Inland Empire white pine belt, these are all placed under the supervision of C. C. Strong, Associate Forester.

e. Cooperative Local Control, National Parks, Washington. *C. C. Strong, Associate Forester, assisted by H. F. Geil, Agent.

f. Cooperative Local Control, Oregon. L. N. Goodding, Associate Pathologist, assisted by C. P. Wessela.

g. Cooperative Local Control, California, W. V. Benedict, Assistant Forester, assisted by project leaders, T. H. Harris, R. Blomstrom and D. R. Miller, Junior Foresters; F. A. Patty, Assistant Pathologist; J. C. Ball, W. B. Dunshee, B. Howard, A. London, W. W. Spinney; stenographic work performed by Mrs. Martha Boudreau.

h. Education Work. H. M. Cowling, Agent, assisted by D. L. Swartz, Agent

i. Studies on Spread of the Rust and Damage to Pine. E. L. Joy, Junior Forester, assisted by C. M. Chapman, R. E. Myers, L. N. Nelson, and F. F. Staat.

j. Experimental Chemical Eradication of Ribes and Barberry. H. R. Offord, Agent, assisted by C. R. Quick, Junior Microanalyst, R. P. d'Urbal, Assistant Chemist, G. R. Van Atta and J. A. Vogtmann, Agents, and Frances Greenfield, Junior Clerk-Stenographer.

3. State Leaders:

a. Montana, C. H. Johnson, Associate Pathologist.

b. Oregon, L. N. Goodding, Associate Pathologist, assisted by Mrs. Lillian Knoll, Clerk.

c. California, G. A. Root, Associate Pathologist.

4. Business Administration, Disbursing and Clerical Work:

R. L. MacLeod, Agent, assisted by A. H. Glasgow, Agent; Miss M. L. McWold, Senior Clerk and Temporary Special Disbursing Agent, assisted by Mrs. E. M. Jump (resigned September, 1933) and Mrs. M. C. Dowdy, Clerks. Mrs. L. E. Klatt, Clerk, assisted by Mrs. E. K. Anderson, Junior Typist, Miss M. V. Lynch, Under Clerk-Typist, Miss C. Ryan, Junior Clerk-Stenographer, Miss Mildred Storaasli, Junior Stenographer, and Regena R. Rieth, Junior Typist.

5. Collaborators:

H. P. Barss, Corvallis, Oregon.
Dr. J. P. Bennett, Berkeley, California.
Dr. Carl C. Epling, Los Angeles, California.
A. O. Garrett, Salt Lake City, Utah.
Dr. T. H. Goodspeed, Berkeley, California.
Dr. D. R. Hoagland, Berkeley, California.
Dr. E. E. Hubert, Moscow, Idaho.
B. O. Longyear, Ft. Collins, Colorado.
Rutledge Parker, Missoula, Montana.
F. P. Sipe, Corvallis, Oregon.

BLISTER RUST CONTROL WORK IN MONTANA

1933

Blister rust control activities in Montana were continued as a cooperative project between the Bureau of Plant Industry and the Montana Department of Agriculture, Montana Forestry Department, School of Forestry, University of Montana, the Northern Montana Forestry Association, and the Blackfoot Protective Association. There is given below the amendment to the basic memorandum of understanding which was drawn up to cover the cooperative work for the fiscal year 1934, beginning July 1, 1933:

AMENDMENT TO MEMORANDUM OF UNDERSTANDING Effective July 1, 1927 Between THE UNITED STATES DEPARTMENT OF AGRICULTURE, BUREAU OF PLANT INDUSTRY THE MONTANA STATE DEPARTMENT OF AGRICULTURE, MONTANA STATE FORESTRY DEPARTMENT, THE SCHOOL OF FORESTRY, UNIVERSITY OF MONTANA, AND THE NORTHERN MONTANA FORESTRY ASSOCIATION

Cooperative Work in Controlling White Pine Blister Rust in Montana.

* * *

The undersigned mutually agree that the memorandum of understanding between the United States Department of Agriculture, Bureau of Plant Industry, the Montana State Department of Agriculture, Montana State Forestry Department, the School of Forestry, University of Montana and the Northern Montana Forestry Association effective July 1, 1927, to continue in effect until June 30, 1928, shall be continued in full force and effect in all its provisions for the fiscal year ending June 30, 1934, with the exception of paragraph F-6 which shall be amended to read as follows:

F-6. That for the fiscal year July 1, 1933 to June 30, 1934, the Montana State Department of Agriculture will expend about $4,000.00; the Montana State Forestry Department about $1,700.00; the School of Forestry, University of Montana about $300.00; the Northern Montana Forestry Association about $1,000.00; the Blackfoot Protective Association, having been added to this agreement in the amendment for the fiscal year ending June 30, 1932, will expend about $1,000.00; and the Federal Government in behalf of the United States Department of Agriculture, Bureau of Plant Industry about $3,300.00 in connection with the work herein provided for.

The undersigned also mutually agree that this memorandum of understanding shall take effect July 1, 1933 and continue in effect until June 30, 1934 provided that either party may terminate the agreement at any time by a written statement to that effect 30 days in advance of the date of termination desired.

March 22, 1934	A. H. Stafford Commissioner, Montana Department of Agriculture.
March 26, 1934	Rutledge Parker State Forester, Montana Forestry Department
March 26, 1934	I. W. Cook Act. Dean, School of Forestry, University of Montana
March 26, 1934	A. E. Boorman Secretary, Northern Montana Forestry Association.
March 24, 1934	Roscoe Haines Secretary, Blackfoot Protective Association
April 9, 1934	K. F. Kellerman Chief, Bureau of Plant Industry, U. S. D. A.

RIBES ERADICATION - SAVENAC NURSERY

By
W. B. Apgar
Assistant Forester, U. S. Forest Service

INTRODUCTION

The project this year aimed to get as near a 100 percent eradication job as possible within the nursery quarantine zone, which extends a mile in all directions from the cultivated area of the nursery. It was decided that areas worked, shown by strip check to have less than 10 feet of live stem left per acre, would not be reworked. This small amount of Ribes does not represent any appreciable hazard especially since all the Ribes areas are at some distance from nursery white pine stock. To have reworked areas to eliminate every foot of live stem would have been an impractical undertaking and, with the size of crew used, would have resulted in only a portion of the nursery area being completed during the 1933 season. The final count reveals 1,763 acres worked, 193,011 Ribes eradicated and the amount remaining within the quarantine zone averaging only seven feet of live stem per acre.

HISTORY

It was impracticable to start the work early this spring, since approximately 68 percent of the area within the mile zone having Ribes is stream type and high water made a thorough job impossible. The project was started on June 1 with a crew of seven men, which was increased to nineteen within a week. This crew was maintained at full strength until September 1, when it was deemed advisable to reduce the crew to 16 men. The crew was organized, for the most part, from men who had been on the regular nursery crew. Only four men had had previous Ribes eradication experience. It was only through the hard work and intense interest of these men that the final mark was achieved. On September 25, the Ribes leaves were falling rapidly, and a thorough job could not be done; so the work was discontinued for this year.

PROJECT RESULTS

Reference is made to the accompanying maps and tables. The area within the mile quarantine zone contains 1,463 acres, which supported a stand of Ribes. Of this amount, 999 acres are stream type and 464 acres are upland type. In order to work the area systematically it was divided into eight blocks or drainage systems bounded by the mile limit. In two cases, namely upper Savenac Creek and the East Fork of Dry Creek, it seemed advisable to work a short distance outside the boundary in order to clean up some bad concentrations of *Ribes petiolare.*

Later in the summer it was decided to include that part of Haugan ridge on the north slope just outside the mile limit on account of a heavy concentration of *R. viscosissimum.* This area added 300 more acres, bringing the total acreage worked to 1,763 acres. There still remains about 150 additional acres on the west end of the new block which should be worked next year.

The majority of the work was done by the hand pulling method, using the regular three-man crew organization. Special care was exercised to insure that all roots were grubbed out. Several small areas of heavy concentrations of *R. petiolare*, amounting to 10.4 acres, were sprayed with sodium chlorate or Atlacide.

Cutting and piling of the brush was necessary on Big Creek and upper St. Regis blocks on account of dense brush and alder patches. In addition to the eradication crew, a group of CCC men cut and piled the brush for a mile along Savenac Creek adjacent to the nursery. Brush was burned on about half of this area. The clearance of this land, besides benefiting the control job, opened up possibilities of land for further nursery expansion. Due to rainy weather this fall, it was impossible to burn the brush on the remainder of the areas. This should be done as soon as possible next spring in order to get rid of Ribes bushes under the piles.

During the survey in establishing the boundary lines, an effort was made to locate all section corners and mark them. Additional markers were placed on all streams showing the distance to which eradication work was done.

A total of 193,011 Ribes bushes were eradicated this summer. The reworking of certain parts of the area accounted for 8.2 percent of this amount. The following tabulations show the percentages by species and age classes.

The acreage figures in this report refer only to those acres on which Ribes were found.

Distribution by species

R. inerme	57.9%
R. lacustre	15.2%
R. viscosissimum	15.5%
R. petiolare	11.4%

Distribution by Age Classes

Seedlings	43.2%
Sprouts	11.5%
Mature	45.3%

One bush of *R. irriguum* was found, notable chiefly as this is the first time on record that this species has been found in this locality.

A close watch was kept for blister rust infection, but none was found on any of the trees. Two Ribes plants were found which were infected with a rust, but these could not positively be identified as the uredinial stage of *Cronartium ribicola*.

CHECKING

Reference is made to the following checker's report of the area which is the work of the checking organization for the Division of Blister Rust Control. I feel that the checking methods and checking work done this summer are highly satisfactory.

It will be noticed that Big Creek was the second in number of Ribes eradicated and still shows the largest number remaining, with Timber Creek and upper St. Regis a close second. Special attention should be paid to these next year.

COSTS

The cost figures for the project are as follows:

S & ER - BR	Salaries...........	$2,958.34	
	Hauling............	4.54	
	Supplies and Equipment.......	48.00	$3,010.88
Impnira - Montana			
	Salaries...........	1,234.31	
	Supplies and Equipment........	.85	1,235.16
	Total...........................		...$4,246.04

The cost per acre is $2.41. These costs do not include any of the nurseryman's time.

RECOMMENDATIONS

The area within the quarantine zone can now be considered as practically Ribes free. Future work should aim to keep it in that condition. A ten-man crew, picked from the crew used this summer, and employed from May 15 to September 30, 1934, should be able to hold it under control. Their work would consist of the following jobs:

1. Complete coverage of quarantine zone.
2. Burning brush already piled, as early in spring as possible.
3. Further brush piling and burning where necessary, especially on Big Creek and Savenac Creek.
4. Continued operation on Haugan slope adjacent to plantations.
5. Collection of map data and improvement of map.
6. Scouting Ribes-free areas within zone and scouting for signs of infection.

TABULAR RESULTS OF RIBES ERADICATION, SAVENAC NURSERY, 1933

Block	Acres Worked			Man Days	Number Ribes Pulled				Gals. Spray Used	Cost of Work	Per Acre Basis		
	Stream	Up-land	Total		Seed-lings	Sprouts	Mature Bushes	Total			Man Days	Ribes	Cost
1. Big-McGee Creeks	175		175	277	21,169	3,363	24,418	48,950	36*	$903.10	1.58	280	$5.16
2. Upper St. Regis	287	95	382	394	22,309	4,990	32,716	60,015		1,283.76	1.03	157	3.36
3 and 8 Haugan Slope	109	654	763	242	1,374	779	31,936	34,089		790.17	.31	45	1.04
4. Dry Creek	61		61	89	9,162	3,645	4,611	17,418	446*	288.53	1.46	286	4.73
5. Savenac Creek	300	15	315	229	11,938	4,931	6,181	23,050	238*	747.72	.73	73	2.37
6. Timber Creek	30		30	24	350	592	907	1,849		78.57	.80	62	2.62
7. Lower St. Regis	37		37	47	5,227	915	1,498	7,640		154.19	1.27	207	4.17
All	999	764	1,763	1,302	71,529	19,215	102,267	193,011	720*	$4,246.04	.74	109	$2.41

*Chemical used was purchased and charged to the job in previous years.

TABULAR STATEMENT OF NUMBER OF RIBES PULLED BY SPECIES AND CLASS OF BUSHES
1933

Block	R. lacustre			R. viscosissimum			R. petiolare			R. inerme			All Species			Tot. No Ribes All Species and All Classes
	Seed-ling	Spr.	Ma-ture	Seed-ling	Spr.	Mature	Seed-ling	Spr.	Ma-ture	Seed-ling	Sprout	Mature	Seed-ling	Sprout	Mature	
1. Big-Magee Creeks	4,756	1,208	2,545				730	674	2,495	15,683	1,481	19,378	21,169	3,363	24,418	48,950
2. Upper St. Regis	796	561	607				472	37	1,120	21,041	4,392	30,989	22,309	4,990	32,716	60,015
3 and 8 Haugan Slope	276	216	1,542	1,044	525	28,269			60	54	38	2,065	1,374	779	31,936	34,089
4. Dry Creek	2,103	1,029	1,585				6,263	1,942	1,530	796	674	1,496	9,162	3,645	4,611	17,418
5. Savenac	4,865	1,061	1,357				4,230	435	1,774	2,843	3,435	3,050	11,938	4,931	6,181	23,050
6. Timber Creek	57	53	183				30	36	83	263	503	641	350	592	907	1,849
7. Lower St. Regis	3,759	300	496				17	19	56	1,451	596	946	5,227	915	1,498	7,640
All	16,612	4,428	8,315	1,044	525	28,269	11,742	3,143	7,118	42,131	11,119	58,565	71,529	19,215	102,267	193,011

FINAL CHECKING REPORT, SAVENAC NURSERY, 1933

Area	Type	Acres in Checked Area	Acres Checked	Acres Worked Twice	Acres Checked Twice	Ribes Per Acre									
						R. lac.		R. vis.		R. iner.		R. pet.		Total	
						Bu.	FLS	Bu.	FLS	Bu.	FLS	Bu.	FLS	Bu.	FLS
Savenac Creek	Stream	92	8.04	2	0.24	2	3			1	1	2	3	3	6
Upper St. Regis	Upland	95	3.80												
" " "	Stream	127	10.12	23	1.84	1	2			1	7	1	1	2	9
Upper St. Regis and	Upland	354	14.18			1	1	1	1					1	1
Haugan Slope	Stream	109	8.74	13	1.04	1	1			1	4			2	4
Big Creek	Stream	50	4.04			2	3			2	3	1	1	4	7
Upper Savenac	Upland	15	1.90												
Creek	Stream	208	17.24	5	0.28	2	3			1	2	1	1	3	6
Lower St. Regis and Big Creek	Stream	125	10.14			3	5			1	4	1	1	4	10
Upper St. Regis	Stream	197	15.70	32	1.12	1	2			2	3	1	1	3	5
Timber Creek	Stream	30	3.74	3	0.56	1	1			1	8			3	9
Dry Creek	Stream	61	8.50			2	3			2	3	1	1	4	7
Total	Upland	464	19.88			1	1	1	1					1	1
	Stream	999	86.26	78	5.08	2	3			1	3	1	1	3	7
Grand Total		1,463	106.14												

Note: Upland type, except for 250 acres in Block 3, is jack pine flats, unsuited to Ribes growth.

It is noted that number of bushes and feet of live stem added across do not equal corresponding totals. The reason for this is that fractions were in all cases converted to the nearest whole number.

BLISTER RUST CONTROL WORK IN IDAHO
1933

Blister rust control activities in Idaho were continued as a cooperative project between the Bureau of Plant Industry and the Idaho State Department of Agriculture, the Idaho State Land Board, the Idaho State Board of Forestry, the University of Idaho, the Clearwater Timber Protective Association, the Potlatch Timber Protective Association, the Coeur d'Alene Timber Protective Association, the Pend Oreille Timber Protective Association, and the Priest Lake Timber Protective Association.

The general memorandum, effective July 1, 1931 and to remain in effect indefinitely, is shown in the 1931 annual report. No special amendments were executed during 1933.

RIBES ECOLOGY IN THE INLAND EMPIRE
1933

By
Charles W. Waters
Agent

INTRODUCTION

Ribes ecology investigations in the Inland Empire during the past two seasons have consisted entirely of detailed studies of the problem of the control of the upland species, *Ribes viscosissimum*. It seems evident that this species of Ribes presents a problem to the Ribes eradication forces, distinct from that of the stream type species, and one which might possibly be partially solved in a manner other than by direct pulling or spraying of the bushes.

During the season of 1932, as indicated in the annual report for that year, field investigations were concentrated in those areas included in the operations of the Clearwater unit of the Potlatch Forests, Inc. in which, for the most part, a selective type of logging on a sustained yield basis had been practiced. It was the aim of the studies to determine any possible influence of such logging practice on the upland species of Ribes. The results of such investigations were indicative enough to warrant the continuation of studies of a somewhat similar nature in other areas of the Inland Empire.

During the 1933 season, nearly ten thousand acres of cut-over and burned-over lands were covered, in an attempt to obtain additional information concerning the possible influence of timber cutting and brush disposal methods on the inception and survival of the upland species of Ribes - *R. viscosissimum*. By means of studies of this kind it is hoped that enough light will be thrown on the subject to determine whether or not *R. viscosissimum* might be controlled wholly or partially by cutting methods.

METHODS

The methods used this season were practically the same as for the season of 1932, with the exception that the studies were much more extensive. Compass lines were run 20 chains apart across the areas to be studied. On these lines at five-chain intervals, milacre sample plots (13.2 feet by 3.3 feet) were laid down. Within these milacres were counted: all Ribes seedlings, by species and year of germination, white pine and other coniferous seedlings, with year of germination and, in addition, an estimate was made of the number of residual trees which had survived the logging or burning. The latter was done in the following manner. From a point at the exact center of each milacre all living trees were counted within a radius of approximately 26.3 feet. This gave the number of trees in 1/20 of an acre. By repeating this count at each milacre, the average number of residual trees per acre for the whole area was computed. Those trees having a D. B. H. of from one inch to six inches inclusive were counted in one group and those above six inches were tabulated separately. In addition to the actual tree count, at each milacre, an estimate was made of the light intensity (referred to in the report as "density"). This was done by designating the unit 1 as representing an entirely

bare area with no trees present, and 10 as representing a dense mature stand with the canopy entirely closed. While such figures at best could be only a mere personal estimate, it was interesting to note how the density index followed rather closely the residual tree count.

Most of the areas studied were located in the region known as the Palouse division of the Potlatch Forests, Inc. They were all included in an area extending from Elk River, Idaho on the south, to St. Maries and Calder, Idaho on the north and from the upper Basin and Mica Creek on the east to Cornell, Round Meadow and Emida, Idaho on the west. All the land covered by the studies was privately owned with the exception of a small portion of state land in T. 41N, R. 2E., Sec. 36. The attempt was made to include in the study those cut-over lands which represented as many types of cutting and brush disposal as was possible. After making a preliminary survey of the field, it was found that the bulk of the timber lying within the limits mentioned above had been clear cut and broadcast burned.

The areas studied represent cuttings made from 1926 to 1931 inclusive. In practically all the operations prior to 1930, apparently no attempt had been made to leave anything of merchantable value, and the burns which followed were of a broadcast nature, accidently or otherwise. On some of the later cuttings, (i.e., 1930 or later) only white pine and some cedar had been removed, and efforts had been made to dispose of the brush by piling and burning. On others, especially those from which only white pine and cedar had been removed, no brush disposal had been made. Several areas showed partial brush disposal, which was advantageous to the study, for it gave excellent opportunities for comparison of different conditions in the same general locality.

Upon assembling the field data for the 30 areas studied, it soon became apparent that they segregated themselves naturally into four distinct categories or groups, depending on the treatment accorded each area. They are as follows:

Group No. 1 Clear-cut and partial-cut, but brush not burned. This group might be considered as a heterogeneous group, since it represents portions of areas which were clear-cut, but with no brush disposal whatever, and excellent examples of good selective cuttings in which the brush had not been burned, although usually piled. The number of residual trees averaged from 100 to over 300 per acre with an average density range of from 3.4 to 5.7. Plate No. 1, 1285, illustrates an area typical of this group.

Group No. II. Partial-cut, piled and burned. These areas represent, for the most part, what might be termed a type of selective cutting, in that only merchantable white pine and cedar were removed. The brush was piled and burned. The average number of residual trees was from 100 to 250 per acre, with the density ranging from 3 to somewhat over 4.5. Plate No. I, 1283 is typical of Group No. II.

Group No. III. Clear-cut, medium broadcast burn. In these areas everything of merchantable value had been removed. Following the logging operations, the area had been subjected to a medium burn, which did not completely destroy the duff and humus; and which left from 20-70 residual trees per acre with an average density range of from 2 to about 4. Plate No. II, 1292 illustrates this.

W-1283. An area typical of those included under Group No. II, in which a type of selective logging had been administered. On such areas the brush had been carefully piled and burned, with the result that the majority of the stored Ribes seeds had not been stimulated to germination.

W-1285. An area potentially about the same as pictured above, but on which the brush had not yet been burned. This is typical of some of the areas making up Group No. I. Judicious burning will produce an area similar to 1283 with low Ribes count, and fair white pine reproduction, since many good white pine seed trees have been left standing. Careless burning may turn this into a wilderness of Ribes bushes.

W-1282. Clear cut area followed by a medium burn, which was not sufficiently intense to kill many of the residual trees nor to burn the organic mantle down to mineral soil. Such an area, typical of Group No. III, apparently represents the situation most favorable for R. viscosissimum development.

W-1288. Clear cut area followed by a heavy burn, which destroyed practically all of the organic mantle, together with most of the residual trees. Typical of Group No. IV. On such areas very few R. viscosissimum appear.

WF-BRC-#90-7/15/33

ECOLOGY

Data Taken By________________ Date__________ Name of Area__________

Location of Area S.__________ T.__________ R.__________

Size of Area________________ Date of Disturbance__________

Type of Disturbance________________ Age of Original Stand__________

Remarks____

Line No.	Mil acre No.	Ex-posure	Year	Number of Ribes R. vis.	R. lac.	Others	Number of Conifers W.P.	Other	Residual Stand 1"-6"	7"-	Den-sity	
			1933									
			1932									
			1931									
			1930									
			1929									
			P.B.L.									
			1933									
			1932									
			1931									
			1930									
			1929									
			P.B.L.									
			1933									
			1932									
			1931									
			1930									
			1929									
			P.B.L.									
			1933									
			1932									
			1931									
			1930									
			1929									
			P.B.L.									
			1933									
			1932									
			1931									
			1930									
			1929									
			P.B.L.									

Group No. IV. Clear-cut, heavy broadcast burn. In these areas practically everything of merchantable value had been removed. Subsequent to the logging operations, a heavy fire had swept over the area, consuming most of the duff and humus, and practically all of the few residual trees which might have survived the cutting. Such areas showed an average range of from 10-25 residual trees per acre, and a density range of 1 to 2. An area typical of this is shown by Plate No. II, 1288.

Data were recorded on special field form #90 as appended. The following shows the four groups with number of areas and number of acres and milacres in each.

	No. of Areas	No.Milacres	No. of Acres
Group No. I, Brush not burned......	11	333	2313.40
Group No. II, Partial-cut, brush piled and burned..........	5	182	1332.29
Group No. III, Clear-cut, medium burn......................	8	296	2140.15
Group No. IV, Clear-cut, heavy burn............................	6	221	1587.26

Graph No. I represents a complete graphical summary of the 30 areas studied, arranged according to groups, and showing the subsequent effects of the manner of treatment of the several groups upon the resultant Ribes and white pine population. The number of residual trees left on the areas following such cutting and burning, is also included.

Tables Nos. 1, 2, 3, 4 show the data for the individual areas making up the four groups listed above. The amount of coniferous reproduction other than white pine is not listed in these tables.

Comparing the results of the four tables, it is strikingly evident that the method of cutting and subsequent brush disposal apparently had a direct effect on the number of R. viscosissimum, which made their appearance following logging operations.

Considering Table No. 1, which contains the data obtained from all the areas on which no actual burning accompanied the logging operations, we find a total average of 184.93 R. viscosissimum per acre. The average for this group, while remarkably low, would have been considerably lower had it not been for Area No. P3 with an average of 1,060 per acre. This area directly adjoined Area No. M3, which was broadcast burned and had an average of 14,600 R. viscosissimum per acre. Area No. M3 probably represented one of the most favorable sites for Ribes that existed in northern Idaho. In addition, area No. P3, while not burned, had been very greatly disturbed by skid trails, etc., and possibly should not have been included in Group No. I. At any rate, it was not typical of other unburned areas. In spite of this typical area, the average for the group is not high. Comparing the results of this group with those of Group No. 2, as shown in Table No. 2, we find a R. viscosissimum average of 349.2 per acre in the latter; almost twice the number of the former. Since this group contains, in its entirety, those areas which were logged in a manner more nearly approaching the majority of those of Group No. 1, (i.e.,

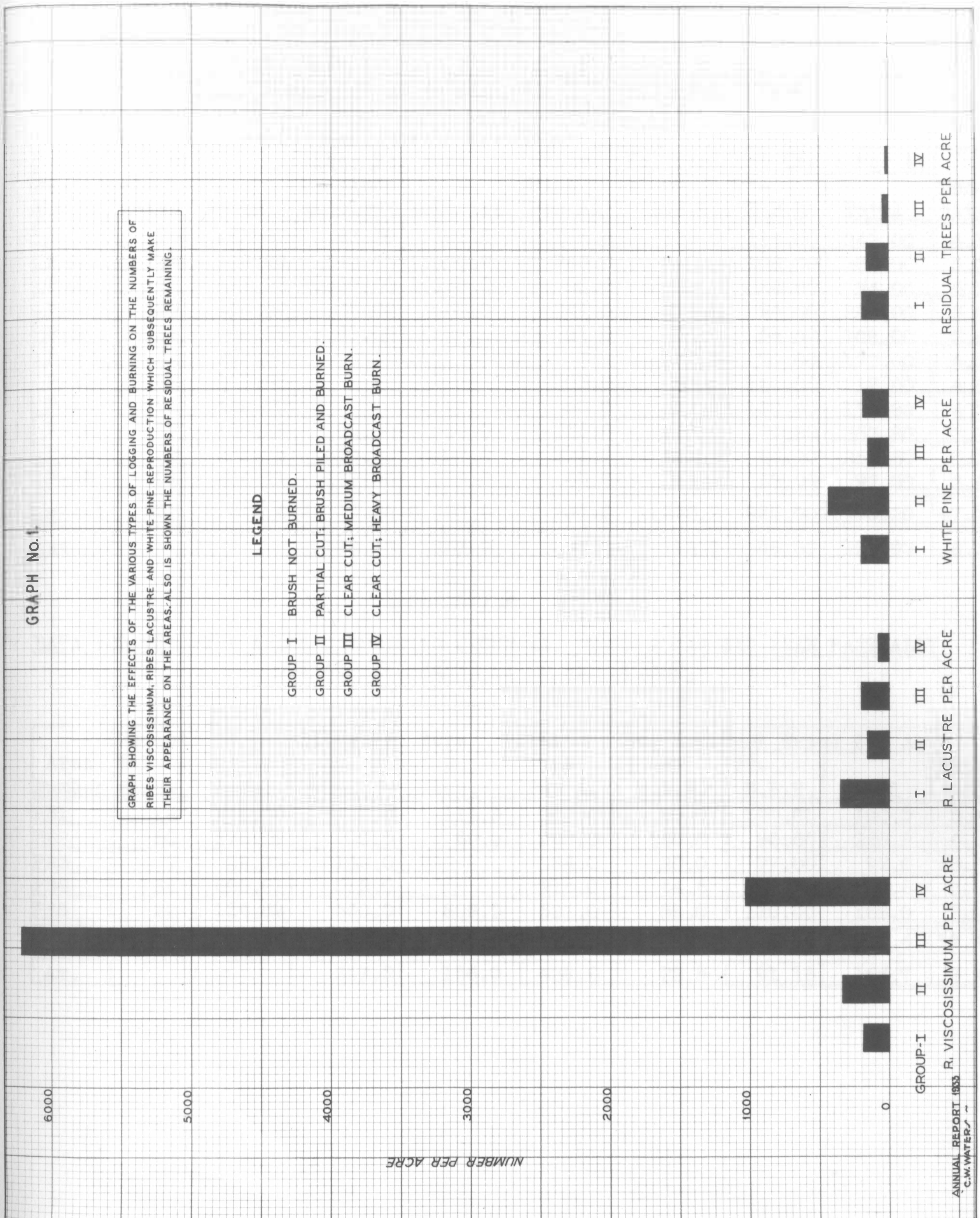
GRAPH No. 1
GRAPH SHOWING THE EFFECTS OF THE VARIOUS TYPES OF LOGGING AND BURNING ON THE NUMBERS OF RIBES VISCOSISSIMUM, RIBES LACUSTRE AND WHITE PINE REPRODUCTION WHICH SUBSEQUENTLY MAKE THEIR APPEARANCE ON THE AREAS. ALSO IS SHOWN THE NUMBERS OF RESIDUAL TREES REMAINING.
LEGEND
GROUP I BRUSH NOT BURNED.
GROUP II PARTIAL CUT; BRUSH PILED AND BURNED.
GROUP III CLEAR CUT; MEDIUM BROADCAST BURN.
GROUP IV CLEAR CUT; HEAVY BROADCAST BURN.
NUMBER PER ACRE
6000
5000
4000
3000
2000
1000
0
GROUP-I II III IV
R. VISCOSISSIMUM PER ACRE
I II III IV
R. LACUSTRE PER ACRE
I II III IV
WHITE PINE PER ACRE
I II III IV
RESIDUAL TREES PER ACRE
ANNUAL REPORT
C.W. WATERS

TABLE NO. 1

DATA OBTAINED FOR THE ELEVEN AREAS INCLUDED IN GROUP I, i. e., AREAS WHICH WERE EITHER CLEAR-CUT OR PARTIAL-CUT BUT BRUSH NOT BURNED

Area Number	No. of Mil-acres	Acres	Ribes Per Acre R. viscosissimum	Ribes Per Acre R. lacustre	White Pine Per A.	No. Residual Trees Per A. 1"-6" D.B.H.	No. Residual Trees Per A. 7"- D.B.H.	No. Residual Trees Per A. Total	Density
P-1	24	161.67	83.30	291.0	166.6	128.0	114.00	242.00	4.1
P-2	58	438.80	140.00	1,400.0	760.0	252.0	106.00	358.00	5.3
P-3	31	217.23	1,060.00	1,130.0	90.0	30.0	64.00	94.00	5.2
P-6	29	198.32	35.00	630.0	241.0	174.0	94.00	268.00	5.0
P-8	11	46.37	91.00		91.0	54.0	54.00	108.00	3.4
P-9	29	198.32				102.0	70.00	172.00	4.0
P-10	34	243.86			206.0	93.0	124.00	217.00	4.6
P-12	21	132.70			50.0	22.8	100.00	122.80	4.0
P-13	17	100.26	59.00	59.0	236.0	182.0	71.80	253.80	3.0
P-14	28	191.76	429.00	107.0	321.0	161.4	94.20	255.60	5.7
P-15	51	384.11	137.00	313.0	40.0	34.0	63.00	97.00	3.4
Total	333	2,313.40	2,034.30	3,930.0	2,201.6	1,233.2	955.00	2,188.20	47.7
Av.			184.93	357.2	200.1	112.1	86.82	198.92	4.3

TABLE NO. 2

DATA FOR THE FIVE AREAS COMPRISING GROUP II, THESE AREAS HAD BEEN PARTIALLY CUT AND THE BRUSH PILED AND BURNED.

Area Number	No. of Mil-acres	Acres	Ribes Per Acre R. vis.	Ribes Per Acre R. lac.	White Pine Per A.	No. Residual Trees Per A. 1"-6" D.B.H.	No. Residual Trees Per A. 7"- D.B.H.	No. Residual Trees Per A. Total	Density
PB1	18	105.06	722.0	111.0	333.0	80.0	100.00	180.0	5.5
PB2	50	376.58	20.0	60.0	840.0	160.0	90.80	250.8	4.1
PB3	7	29.95	142.0		284.0	20.0	77.00	97.0	3.0
PB4	84	665.81	512.0		214.0	44.6	78.00	122.6	3.0
PB5	23	154.89	350.0	609.0	522.0	58.0	110.00	168.0	3.8
Total	182	1,33229	1,746.0	780.0	2,193.0	362.6	455.80	818.4	19.4
Av.			349.2	156.0	438.6	72.5	91.16	163.7	3.9

a selective type of logging with respect to number of individual trees left standing), the increased number of Ribes can only mean that they reflect the effects of the burning operations. Thus, the burning of brush, even though carried on according to the best approved methods, tends to stimulate the inception of Ribes.

Passing to Table No. 4, which includes the results of the six areas contained in Group No. 4, (i.e., those areas which had been clear-cut followed by a heavy broadcast burn), the number of Ribes has increased to 1,043 per acre. It is interesting and essential to note that the number of living trees remaining on the areas averaged only 22.01 per acre. Since these trees were not uniformly distributed over the several areas, it means that there existed hundreds of acres with scarcely a living tree, while other regions probably possessed a considerable number. If the field notes were reproduced here, it would be seen that in those localities where no living trees were present scarcely any Ribes plants were found, but in localities showing a number of living trees which had not been killed by the fire, a heavy concentration of Ribes usually resulted.

The relation between the intensity of the burn, and, of course, the resulting number of living residual trees, and the number of R. viscosissimum is better brought out by an analysis of Table No. 3 which contains the results for Group No. 3. In this table is found an average of 6,225 R. viscosissimum per acre for the eight acres studied. The average number of residual trees was 46.3, over twice as many as for Group No. 4. From such results, one can not help but conclude that in any area, provided it is a potential Ribes site, logging followed by burning will bring in more Ribes than logging without the burning. As the burn becomes more general the number of Ribes will increase. However, if the burn be too intense, there comes a time when the number of Ribes will again diminish in number. In a general way, at least, this can be measured by the number of living trees left on the areas. The explanation for all of this seems to be that in any stand of timber, providing it be a potential R. viscosissimum site, there apparently exists, irregardless of the age of the stand, large numbers of Ribes seeds, stored mainly in the lower layers of the organic mantle. Following any disturbance of this organic mantle, whether due to mechanical influences such as skidding, road building, etc., or fire, or a combination of both, numbers of these stored seeds are stimulated to germination. If the fire is intense enough to destroy the entire organic mantle, such stored seeds are actually destroyed and no Ribes plants will result. Under such circumstances, likewise a large percent of the trees which may have survived the actual cutting process will be killed by the fire. Consequently, within reasonable limits, the number of trees remaining on an area following a burn is indicative of the number of Ribes to be found there. Thus it is that in Group No. 4, following heavy burns the number of Ribes is only about one-sixth as great as in Group No. 3, while the corresponding number of trees per acre is less than half. This relation of tree number to Ribes number is brought out in an interesting manner in Plate No. III, which is an aerial map of one of the drainages studied. On this map are marked off two areas, B1 and M1, B1 represents a very heavy burn following a clear-cut operation. So intense was the burn that there remained only 26 residual trees per acre, with a Ribes count of 162 per acre. As the burn worked up the slope, for some reason it became less

TABLE NO. 3

TABLE SHOWING DATA FOR THOSE AREAS WHICH HAD BEEN CLEAR-CUT, FOLLOWED BY A MEDIUM BROADCAST BURN, SUCH AREAS COMPRISE GROUP III.

Area Number	No. of Mil-acres	Acres	Ribes Per Acre R. vis.	Ribes Per Acre R. lac.	White Pine Per Acre	No. Residual Trees Per A. 1"-6" D.B.H.	No. Residual Trees Per A. 7"- D.B.H.	No. Residual Trees Per A. Total	Density
M-1	36	258.02	12,000	83.0	305.0	20.6	32.0	52.6	3.9
M-2	63	482.52	4,111	460.0	270.0	8.8	20.0	28.8	2.3
M-3	35	251.03	14,600	860.0	200.0	12.0	11.0	23.0	2.3
M-4	29	198.32	1,620		345.0	9.7	18.6	28.3	2.0
M-5	56	424.44	6,530	18.0	53.0	30.6	46.0	76.6	2.3
M-6	30	210.10	1,400		33.0	20.0	14.0	34.0	2.3
M-7	16	98.49	1,440	125.0		51.2	58.0	109.0	3.1
M-8	31	217.23	8,000	96.0	32.0		18.0	18.0	1.7
Total	296	2,140.15	49,701	1,642.0	1,238.0	152.9	217.6	370.3	19.9
AV			620.1	205.2	155.0	19.1	27.2	46.3	2.5

TABLE NO. 4

RESULTS OBTAINED FROM AREAS WHICH HAD BEEN CLEAR-CUT FOLLOWED BY A HEAVY BROADCAST BURN, GROUP IV.

Area Number	No. of Mil-acres	Acres	Ribes Per acre R. vis.	Ribes Per acre R. lac.	White Pine Per A.	No. Residual Trees Per A. 1"-6" D.B.H.	No. Residual Trees Per A. 7"- D.B.H.	No. Residual Trees Per A. Total	Den-sity
B-1	71	549.89	662	113.0	270.0	11.00	15.0	26.00	1.90
B-2	38	272.50	105	105.0	131.0	12.10	22.6	34.70	2.90
B-3	57	430.50	3,160	87.0	105.0	10.80	7.0	17.80	1.50
B-4	24	161.60	1,750		41.0	4.10	6.0	10.20	1.70
B-5	11	46.37	181		270.0	32.60	10.8	43.40	1.70
B-6	20	126.40	400	100.0	300.0				1.00
Total	221	1,587.26	6,258	405.0	1,117.0	70.60	61.4	132.10	10.70
Av.			1,043	67.5	186.1	11.76	10.2	22.01	1.76

intense, with the result that in the area designated as M-1, 52.6 living trees per acre remained standing. The corresponding Ribes count reached the amazing total of 12,000 per acre. A study of the factors involved, forces one to the conclusion that the difference in burn intensity was the main, if not the sole contributing factor, to the wide difference in number of Ribes plants found on the two areas. A glance at the Plate is sufficient to show the difference in number of trees on the two areas. So constant is this relation of tree numbers to Ribes numbers that one has only to look over an area which has been logged and burned, either by means of an aerial photograph or by being actually on the ground, to determine within a fair degree of accuracy where the heavy concentrations of R. viscosissimum are to be found. This, of course, is provided that the area is in general a Ribes site.

With respect to R. lacustre, although a record was kept of all plants encountered, it can be seen from the recorded data, that there is apparently no direct correlation between the pretreatment of the area and the extent to which they make their appearance. This is probably due to the fact that this species of Ribes seeks the more moist habitats, and their heavy concentration along the stream bottoms of the several areas would tend to throw the total number of them all out of proportion. The same lack of correlation was obtained last year in the studies made in the Clearwater. It is the belief of the writer that R. lacustre must be left almost wholly to the Ribes eradication crews.

The numbers of white pine reproduction recorded for the several areas were not high since in very few cases had any attempt been made to provide for the restocking of the area by allowing seed trees to remain. Referring to Table No. 2, which represents the areas on which the brush had been piled and burned, and which represented, for the most part, the outstanding examples of good cutting and brush disposal met with during the past season, an average of 438.6 white pine seedlings per acre were found. This was the highest average of any of the four groups of areas, and corresponded well with some of the averages obtained last year in the selectively logged areas of the Clearwater. For example, referring to the annual report of 1932, it was shown that in the 1930 cuttings there was an average of 241.3 white pine seedlings per acre, while in the 1929 cuttings the number reached 775.4 per acre. Comparing these numbers with those obtained during the current year for Group No. II, which represented on the average, cuttings extending from 1929 to 1931, and which represented for the most part the nearest approach to a selective type of logging of any encountered, the results appear to be quite favorable. This leads one to infer that it is possible to administer an area in the region studied during the past summer in a manner so as to insure a fair reproduction of white pine.

The paucity of white pine seedlings so apparent in the other groups such as No. III and No. IV, appears to be wholly due to the more destructive manner of logging and burning. Further, it appears, basing our judgment on the studies of 1932, that with the type of logging as represented by Group No. II, successive years will show a progressive increase in the amount of white pine reproduction within such areas so that by 1935, one should expect to find the amount of white pine reproduction increased to 1,000 or more per acre. This, coupled with the probability that the numbers of R. viscosissimum will decline at an appreciable rate as the cuttings become older, shows the possibility of

A-851 Aerial photograph of a burned over area showing the relation of the intensity of the burn to the numbers of R. viscosissimum which subsequently appear. The burn which swept over area M-I was apparently not intense enough to destroy the Ribes seeds stored in the organic mantle, with the result that they germinated at the rate of 12,000 per acre. On area B-1, which was heavily swept by fire, only 662 R. viscosissimum plants per acre appeared. Official photograph 116th Photo Section, W. N. G.

as follows:

Group No. I. Clear-cut or partial-cut, brush not burned. This group includes some areas which had been clear-cut and others which had been cut on a partial basis. No brush burned.

Group No. II. Partial-cut, brush piled and burned. On these areas only white pine and cedar had been removed and good brush disposal followed.

Group No. III. Clear-cut, medium broadcast burn. On these areas, the burn which followed the actual cutting operations was not sufficiently intense to destroy the organic mantle or to kill many of the residual trees.

Group No. IV. Clear-cut, heavy broadcast burn on which practically no residual trees remained and the organic mantle was almost entirely consumed by the burn.

3. The areas included under Group No. I on which no brush had been burned, showed the lowest average number of _R. viscosissimum_ of any of the four areas studied. This was true, in spite of the fact that some of the individual areas making up this group had been clear-cut and the forest floor greatly disturbed.

4. Areas on which the timber had been partially cut and the brush piled and burned showed the next lowest Ribes count.

5. Areas on which the timber had been practically clear-cut, and over which had subsequently swept a general burn of a degree of intensity that the organic mantle was not entirely consumed, showed the greatest number of _R. viscosissimum_. Such burns were not sufficiently intense to destroy many of the residual trees.

6. When a logging operation was followed by an extremely heavy burn, hot enough to destroy completely the organic mantle and practically all of the residual trees, the numbers of Ribes making their appearance was not so great, since it appears that most of the Ribes seeds which had stored in the duff were destroyed by the fire.

7. The effect of various types of cuttings and subsequent treatment of the brush on the inception and survival of _R. lacustre_ does not seem to be as marked as for _R. viscosissimum_. This is probably due to the tendency of this species of Ribes to become heavily concentrated along the stream areas and not to be so widely disseminated over the upland areas.

8. The results of this year's studies on the amount of white pine reproduction on the various logged-over areas appear to confirm those of last year; namely that it is possible to administer an area in such a manner that it will be favorable to the inception and survival of white pine reproduction, while at the same time _R. viscosissimum_ will be inhibited.

RIBES ERADICATION, NORTHWESTERN ZONE, 1933

by
C. C. Strong
Associate Forester

The 1933 Ribes eradication program was the most extensive yet undertaken in the Inland Empire. When preliminary plans were made it appeared fairly certain that the private forest land owners would not renderfinancial assistance to the blister rust control program, due to stagnated business conditions. At that time, the only funds which appeared certain were the regular appropriations to the Forest Service and to the Division of Blister Rust Control, plus a small available appropriation by the State of Idaho. Thus, work on private lands would have been practically out of the question, and the 1933 work would have confined to the national forests, and a small block of white pine forest land belonging to the State of Idaho.

When the Emergency Conservation Corps program became a reality, there was still a great deal of uncertainty as to the number of camps which would be assigned to blister rust control work. However, the original allotment was 40 camps and plans were made immediately for training sufficient supervision to handle the work. The final number of camps approved for blister rust control was 35. This represented a reduction in the number of camps originally assigned to the Coeur d'Alene National Forest from 11 to six. In view of this reduction coupled with the necessity for getting work under way on a large scale on this forest, it was decided to use regular appropriations to the extent of financing 25 so-called regular camps. One of the 35 ECW camps did practically no blister rust control work.

When the National Recovery Administration program was announced, plans were immediately begun for additional work on the Clearwater Association, the St. Maries River drainage, and in southern Oregon. Within a week there were five camps of fifty men each operating on the Clearwater Timber Protective Association and seven in the St. Maries River drainage. In addition one such crew was organized on the Clearwater National Forest in Idaho, and two 25-man units on the Rogue River National Forest in southern Oregon.

The 1933 program involved cooperative arrangements between three agencies, namely; the Forest Service, The Division of Blister Rust Control, and the State of Idaho. The State of Idaho, owing to the large assignment of ECW camps to blister rust control work, deemed it advisable not to spend what state funds were available until the field season of 1934. Cooperative relations were approximately on the same basis as in previous seasons. It has been the general practice for the Division of Blister Rust Control to assume the responsibility for conduct of this work from a technical standpoint, with the Forest Service taking care of such matters as policy with regard to areas worked, and the physical arrangements such as furnishing supplies and equipment, handling transportation, assisting in the selection and training of supervisors,etc.

The first undertaking was the selection of areas to be worked. On the Coeur d'Alene Forest, it was decided that four ECW camps should be operated in

the Prichard section, and that the remaining two should be located on the Tepee Creek drainage near the Magee Ranger Station. The 25 regular camps were assigned to the following drainages: Little North Fork of the Coeur d'Alene River, Marie Creek, Laverne Creek, Leiberg Creek, and Cougar Creek. On the St. Joe area the 14 ECW camps assigned were to be located largely in the St. Maries River drainage, the Potlatch Creek drainage, and the Elk Creek drainage. On the Clearwater area the work was largely centered about the western face of the Clearwater Forest, and the eastern section of the Clearwater Timber Protective Association.

Possibly the most important preliminary arrangement was the training of supervisors and checkers for all operations. It was the plan to assign to each ECW camp the following: One camp superintendent to supervise the field work, five foremen as assistants, one checking foreman and four checkers whose duties were to check on work done to see that it measured up to established standards of efficiency. In addition to the camp superintendent, it was necessary to have general supervision, such as unit supervisors, to look after the work of three or more ECW camps, and general supervisors to administer the work on each major project.

It was deemed advisable to establish a separate organization for handling all checking work. This operation, headed by H. E. Swanson, Agent, worked in close cooperation with the Ribes eradication organization at all times.

The most feasible arrangement for training supervisors and checkers was to establish a central training school at Clarkia, Idaho, at which all unit and camp supervisors and most of the checking foremen were present. The training camp was established on May 10 and terminated May 20. The program decided upon for this training school was the following:

1st Day - May 11, 1933.

A.M. General instruction on white pine blister rust. Thorough instruction on the following points, principally:

1. History of disease, spread and development.
2. Life history, cycle, hosts, etc.
3. Blister rust situation - Inland Empire.
4. Program since inception of work in the West.
5. Program for 1933 and immediate future.
6. Illustrated lecture on blister rust.
7. General discussion of Ribes eradication practices.

In addition there will be provided exhibits, pamphlets, articles and various other materials which all men in training will study carefully during the period of training and thereafter. Through the media of this material and the lecture program each man should acquire a thorough working knowledge of the disease and the control program.

P.M. Field inspection of Clarkia infection area and a thorough study on the ground of the factors affecting rust development.

2nd Day:

A.M. Discussion and explanation of field organization as follows:

1. General discussion Ribes eradication program, 1933.
2. Organization each operation.
3. The technician or unit supervisor's job.
4. The 200-man camp unit:
   a. Organization.
   b. The job of the camp superintendent.
   c. The job of the technical foreman.
5. Field inspection and checking of the work.

P.M. Inspection of Ruby Creek infection area and study similar to afternoon of the first day.

Evening, Preliminary explanation of methods of field work on Ribes eradication (hand and chemical).

3d-5th Days:

All men in training engaged upon actual Ribes eradication both by hand and chemical methods under the direction of seasoned supervisors. Each day there will be two-thirds of the men on hand pulling and one-third of the men on spraying assignments. The whole purpose of this work is to give supervisors a first hand knowledge of the job at hand including methods of working, methods of handling crews, record keeping, organizing of the work, lining out areas, etc.

General instructions will be given each evening regarding methods of field work and keeping of records either individually or to small groups.

6th-8th Days:

All men in training engaged upon field assignments as follows each day:

One-third of men conducting administrative check of areas previously worked to inform them regarding the necessity for inspections of work and to show them the most practical methods to use.

One-third of men scouting assigned blocks for purposes of securing information on which to organize the crew work. They will designate and map Ribes eradication types, and construct a plan to be followed by Ribes eradication crews when actually working the area. Plans to be gone over and criticised with the men who constructed plans.

One-third of men actually organizing work of 200 man camp. Included in this instruction will be the maximum usage of available information on the camp area, and on the basis of this information assigning the various 30-40-man units to subdivisions of the camp area. This instruction will furthermore include practice in all other phases of the actual field operation including the assembling, recording and disposal of essential data to be taken.

In the evenings details pertaining to above or any other pertinent matters to be given attention with individuals or groups as the occasion may demand. Problem assignments may make up an important part of this instruction.

During the latter three days especially, the matter of timely planning in relation to time saving is to be given most careful consideration.

At the termination of this field training course, camp superintendents are to be assigned to the three major projects to which they will then proceed. Following immediately will be training courses for technical foremen (five per camp) on each major project. This course will be a partial duplication of the first course in so far as the technical foremen fit into the general organization. It will also include a great deal of preliminary planning for the later work on the respective areas and will include much more elaborate instructions on the details concerning methods, recruiting of crew leaders or straw bosses from the ranks of the enlisted men, personnel problems in so far as they can be anticipated in advance, etc.

Concurrently with the training of Ribes eradication supervisors will be the training of checking supervisors and foremen.

The above program was adopted in advance of the training school. Certain revisions and deviations were necessary due to weather conditions, etc. The following brief report shows what was actually accomplished during this training period.

May 11, 1933. - Thursday:

The training school was opened with a general discussion of the problem confronting organizations administering blister rust work in the west. The background responsible for the adoption of the emergency conservation work program was covered very thoroughly. The general aims, to get work done as well as give the men employed the highest type of instruction in woodmanship, forestry and conservation, planning and organization, were discussed at length.

Following the opening discussions the general subject of white pine blister rust was taken up. Mr. S. N. Wyckoff, Senior Pathologist in Charge Western Division of Blister Rust Control, discussed its history, spread and development in Europe and America, its life history, cycle and hosts. He concluded with a statement of the general situation in the Inland Empire.

Exhibits, pamphlets, articles and various other material were provided for the use of men in training.

In the afternoon the men were separated into parties of about ten men each under the leadership of permanent employees of the Division of Blister Rust Control. The parties then proceeded to examine the blister rust along the Middle Fork of the St. Maries River east of Clarkia, and to study the topographic features and other factors affecting the spread and develop-

ment of blister rust. In each party discussions were held frequently, as men moved from one location to another covering stages of the rust, rate of development, cycles, hosts, etc.

In the evening, the Clarkia school board donated the use of the school building and light plant for an illustrated lecture on blister rust and blister rust control practices. The preliminary information given in the morning and the field inspection in the afternoon had established a background which helped greatly to understand the information presented in the lecture.

May 12 -**Friday:**

The first day had been devoted to blister rust and the problem presented by it. The second day was devoted to discussions of control practices and administration of control work, and further field inspections such as were done in the afternoon of the first day.

The day was started with explanations of the experimental and practical control program since the work began, the proposed program for the field season of 1933, and a general explanation of control practices. This was followed by a thorough discussion and explanation of the field organization or Ribes eradication work. This included projects, units and camps. The jobs of the project supervisor, unit supervisor and camp superintendent were analyzed. Each position was considered from the standpoint of personal qualifications, knowledge, duties, and methods of applying administrative measures. In a similar manner the technical foremen and crew leaders' jobs were analyzed.

Philip Neff, Logging Engineer, Forest Service, Region One, discussed the blister rust situation from the economic standpoint. He brought out the factors which have caused foresters to tie forestry practices around white pine as the key species in the Inland Empire white pine belt.

H. E. Swanson ended the session with a short general discussion of the checking work, its aims and methods, reserving a later date for a detailed discussion of methods of doing the work, and ways of making such information of maximum value to the camp superintendents.

The entire party was again separated into four groups. Each group was placed under the direction of competent, experienced members of the Division of Blister Rust Control for a tour of inspection through the Ruby Creek infection area. Although the blister rust infection in the Clarkia region is far more extensive than is the Ruby Creek infection area, the latter is of earlier origin. The Ruby Creek infection has been held effectively localized, because the surrounding pine areas have been largely burned over and timber killed in recent years. The principal difference between the two areas is the severity of the older infection, Ruby Creek. Again, the essential facts regarding blister rust were emphasized and special attention was given factors which bear upon the behavior of the disease under local conditions.

May 13 - Saturday:

All the men in training had previously been separated into three groups, each under the supervision of a project supervisor and one-third of the experienced permanent and temporary blister rust control employees. One party was assigned to hand pulling in stream type and another in upland areas. The third group was assigned to spraying Ribes petiolare. Because the leaves were not developed sufficiently to permit effective killing, it was deemed inadvisable to spray with the chemical mixture. Hence, only water with the glue added was used.

The primary purpose of this work was to give superintendents a first-hand knowledge of the job at hand, including methods of working, caring for equipment, methods of handling crews, selection of crew leaders, record keeping, organizing work, lining out areas, etc.

May 14 - Sunday:

In the forenoon, some general matters pertaining to the whole job were discussed. Following this, H. E. Swanson gave a detailed explanation of the checking work, its aims, the manner of securing information, and the manner in which that information would be made available to the Ribes eradication organization. Thence the group was turned over to W. W. White, Training Expert of the U. S. Forest Service, who had participated along with Philip Neff in an advisory capacity since the start of the training. He gave an excellent discussion covering ways and means of most effectively teaching young and inexperienced men in woodsmanship, use of tools and proper respect for and use of our forests. He brought out the fact that early training in the use of tools is essential because of the necessity for organizing fire protection units in each camp early, and the possibility of all men going on fire duty at some time during the season. Mr. White also reviewed the matter of analyzing the crew leader's and laborer's jobs.

In Mr. White's discussions on job analysis he made use of the blackboard, and let men in training suggest points to be considered for laborer and crew leader under the following headings:

1. Personal qualification.
2. What each does.
3. Responsibilities.
4. How he does his job.

In the afternoon, two parties were sent out consisting of men who arrived late and had not had an opportunity to inspect either one or both of the infection areas examined during the first two days. One party inspected the Clarkia area and the other the Ruby Creek area. The same method of inspection was used as was followed on May 11 and 12.

May 15 - Monday:

Because of a heavy rain which continued all day, no field work was

advisable. Hence the entire day was given over to group discussions and practice in care of spraying equipment followed by discussions in the afternoon for the entire group.

Group discussions in the morning covered records, methods of doing field work, training of foremen, crew leaders and laborers. The practice with spraying equipment covered the type of equipment used, actual practice in servicing such equipment and methods of using it.

In the afternoon a general session was held during which various matters were considered. Many of the men had questions regarding essential points in the whole program which were discussed. This was followed by a blackboard illustration of the different stages of blister rust on pines and Ribes. The exact time when each stage develops during the life cycle was especially emphasized.

The next general subject considered was a review of the organization of the field work. The following progressive steps were discussed.

1. Training of the foremen.
2. General inspection of the camp area by the camp superintendent
3. Preliminary survey of camp area by block units.
4. Designating crew areas keeping in mind not scattering the work to such an extent that any danger of leaving an excessive number of unfinished portions, near the end of the season, might result.
5. Getting acquainted with and classifying enlisted men.
6. Selection of crew leaders.
7. Training of all enlisted men in woodsmanship and use of tools and in methods of Ribes eradication.
8. Proceeding with the work.

May 16 - Tuesday:

The exact program was followed as on May 13th, except that each group was shifted to another type of work. For instance, the crew which was hand pulling on upland on May 13th was shifted to hand pulling in stream type, etc.

May 17 - Wednesday:

Rain prevented field work in the forenoon. In its place the whole group was given the procedure and method of making the preliminary survey. An outline was presented and discussed. This outline, shown below, was mimeographed and each camp superintendent furnished one as a guide.

Preliminary Survey of Camp Area

I. Equipment Needed.

1. Good map of region.
2. Compass.
3. Map sheet with holder.
4. Pocket rule or scale.

II. Method of Covering Area.

1. Sample streams
   a. Complete cover of main streams.
   b. Sample small upland tributaries.
2. Use of observation points.
3. Sample of all different upland conditions.
   a. Each type.
   b. Ridge tops.
   c. Spot burns.
   d. Rocky areas, etc.

III. How Information is Recorded.

1. Map types to scale.
2. Indicate small burns, openings, rocky areas, etc., by an X, giving size such as one-half acre burn, two acres dense reproduction, etc.
3. Indicate Ribes conditions, other than _R. petiolare_, by letters l, m and h, meaning light, medium and heavy.
4. Indicate R. petiolare conditions with brown crayon as follows: L, M and H, meaning light, medium and heavy. Use light broken line to indicate scattered clumps and solid lines to indicate medium or heavy concentrations, the width of lines being indicative of the relative width of the _R. petiolare_ belt. Use figures occasionally to show actual width as a guide in computing width of type as shown by the type of line used.
5. Indicate location of roads, trails and possible easy routes of travel.

Following the presentation and discussion of the above outline, the men were again separated into the assigned groups. The balance of the forenoon was devoted to consideration of the matter of organizing work.

In the afternoon the crews worked in the field, completing the three day program of hand pulling and spraying.

In the evening the Clarkia school was again made available for the second showing of the set of slides concerning blister rust, Ribes eradication types and aerial views. The type pictures and aerial views were analyzed,

and the information utilized to point out the probable Ribes and working conditions in various types. They were also used as examples to illustrate the method of making a preliminary survey.

May 18.

Field work was interrupted by snow and rain in the forenoon. Individual instructions were given to any who desired further information.

In the afternoon the parties were taken into the field and given a demonstration of the method of making a preliminary survey.

May 19.

Inexperienced men were divided into parties of two under the direction of one experienced man. These parties spent the day in the field making a preliminary survey. For this survey they followed the outline presented to them on May 17.

May 20.

Final selections of camp superintendents for each operation were made, and each man was personally interviewed and given final instructions regarding his future assignment. Then the majority of the men in training were informed that it would be necessary to delay work for one week and report to the project to which they were assigned on Sunday, May 28, 1933.

Following the Clarkia training school, training camps were held on each of the three major projects, where substantially the same training was given foremen.

Upon the completion of all training of supervisors, it was found that due to delay in the arrival of CCC companies there was ample time for camp overhead to make inspections of respective camp areas and make preliminary moves in planning the summer's work. Upon the arrival of the companies there was more or less confusion because temporary camps must be constructed pending completion of permanent camps. This necessitated a great deal of assistance from camp superintendents and foremen, and there was more or less delay in getting men on the ground for work. It was found that practically all the enrolled men of these companies came from eastern states, and that very few of them had ever done any labor of a nature similar to blister rust work. For this reason, it was obvious that a great deal more attention must be given to enrolled men, such as training in the use of tools and woods work in general. Consequently, considerable time was given to this phase of preparation.

METHODS OF WORKING

Methods of working did not differ materially from those practiced in previous years. Hand pulling was the method employed on upland areas and on stream type areas not adapted to other Ribes eradication practices. For

the most part the normal crew consisted of either three or four men. On ECW operations, due to the fact that the foreman must supervise the work of from six to eight of these small crews, it was necessary to group his entire unit so that he would be able to contact each crew at frequent intervals. In the majority of cases the foreman was the only man on his unit who had had any previous experience on blister rust work.

It would have been surprising, with a totally inexperienced crew, had a high percentage of original work been so effecient as not to require reworking. Actually, it was necessary to rework many areas in order to place them in a satisfactory condition.

Spraying methods were likewise similar to those used in previous years. However, it was necessary to delay spraying operations until the men had sufficient hand pulling experience to know what the primary purpose of the job was, and to have a sufficient understanding of the necessity for Ribes eradication to guide them in doing an effective spraying job. Due to the inexperience of these men, it was advisable to insist on a somewhat heavier coverage of spray than would have been necessary, had the men understood thoroughly just how to make every gallon of spray applied accomplish maximum results. The commercial product Atlacide was used for almost the entire season. This chemical was used at the rate of one and one-half pounds per gallon of water. Late in the season when the store of Atlacide became low, it was necessary to purchase a small quantity of sodium chlorate.

Due to the inherent hazards in the use of either Atlacide or sodium chlorate, it was necessary for foremen of spraying crews to spend much time instructing their men regarding these hazards, and to exercise every possible precaution to avoid accidents. Clothing represented a problem, because the CCC boys were not supplied with extras. Since it was necessary to leave all clothing used in the spraying operation out on the job, a stock of six hundred complete outfits of clothing consisting of shoes, trousers, shirts and belts were purchased by the forest agencies from ECW funds.

As has been explained in previous reports, there are rather extensive areas of stream type throughout the white pine belt which support heavy concentrations of R. inerme bushes. It has been found impractical to attempt to kill these bushes by spraying and likewise impractical to attempt to treat such areas by the hand pulling method. The most practical method of treating such areas is the use of heavy machinery equipped with what is known as a bulldozer, and also treating such areas by the slashing and burning method. The former method employed on the Coeur d'Alene National Forest will be described in one of the reports following. The slashing and burning method was used quite generally on all the major projects, although the bulk of such work was confined to the St. Joe area. The slashing and burning method requires that the brush be cut and piled, either in windrows or broken piles, and that it be piled in sufficient quantities to insure a complete burn. The windrows and piles wherever feasible are placed over heavy concentrations of R. inerme, and the space between piles is completely worked by the hand pulling method. The burning is done late in the season when the brush is thoroughly dry and

conditions are safe for burning. Ribes crowns under the piles are destroyed during the burning operation.

Due to the inexperience of enrolled men, it was always the policy to confine them to areas of relatively many Ribes bushes. It was feared that working these men on areas which are normally scouted by thoroughly experienced and reliable men would result in much lost effort. Hence, the policy of confining efforts largely to areas where little searching for bushes was necessary. As a result, a relatively high percentage of time on upland work was consumed in actual hand pulling. The measuring stick was a rule specifying that pole and mature types, having less than 150 feet of Ribes live stem per acre, were not to be worked by CCC men. Actual determinations were made from advance strip data secured by checkers.

Working hours in regular and NIRA camps differed materially from the working hour schedule in ECW camps. In the regular camps a working day consisted of eight hours of actual Ribes eradication; the men walking to and from work on their own time. Five and one-half days, or 44 hours, constituted a week. The same plan was followed in NIRA camps except that men worked only 40 hours per week.

At ECW camps, men were required to return to camp eight hours from the time they left and they were allowed one hour for lunch. Furthermore, men worked only five days per week. A certain amount of time was consumed each day in riding or walking to and from work. This proportionately reduced the available time for actual field work. The average effective working hours per man assigned to field work did not exceed six. Thus, in order to arrive at the number of effective man days on ECW operations, the total hours of actual work was divided by eight.

RESULTS OF WORK DONE

Detailed tables showing the work accomplished will be found in the individual reports; however, a general summary of all work accomplished is inserted here to show the complete accomplishment. The tables follow:

TABLE NO. 1

RECORD OF WORK DONE BY ECW CAMPS - RIBES ERADICATION INLAND EMPIRE
1933

Eradication Type	Initial Eradication: Acres	Initial Eradication: Effective Man Days	Initial Eradication: Total Ribes	Initial Eradication: Gallons Spray	Initial Eradication: Per Acre Basis: Man Days	Initial Eradication: Per Acre Basis: Ribes	First Mop-up: Acres	First Mop-up: Effec-tive Man Days	First Mop-up: Total Ribes	First Mop-up: Gallons Spray	First Mop-up: Per Acre Basis: Man Days	First Mop-up: Per Acre Basis: Ribes	Total Eradication: Acres	Total Eradication: Effec-tive Man Days	Total Eradication: Total Ribes	Total Eradication: Gallons Spray
Open reproduction	26,295	33,185	10,015,228		1.26	381							26,295	33,185	10,015,228	
Dense reproduction	19,462	11,012	1,432,024		.57	74							19,462	11,012	1,432,024	
Open pole	16,412	7,833	1,241,705		.48	76							16,412	7,833	1,241,705	
Dense pole	2,649	1,037	122,324		.40	46							2,649	1,037	122,324	
Open mature	62,046	27,480	6,231,881		.44	100	820	570	176,734		.70	216	62,866	28,050	6,408,615	
Dense mature	8,156	1,633	323,199		.20	40							8,156	1,633	323,199	
Brush	2,928	2,417	309,743		.83	106							2,928	2,417	309,743	
Cut-over	8,158	5,545	1,712,853		.68	210							8,158	5,545	1,712,853	
All upland	146,106	90,142	21,388,957		.62	146	820	570	176,734		.70	216	146,926	90,712	21,565,691	
Stream (hand)	12,975	30,991	6,096,569		2.39	470	4,628	4,682	869,800		1.01	188	17,603	35,673	6,966,369	
Stream (chemical)	3,993	9,077		251,385	2.27		1,004	1,989		44,292	1.98		4,997	11,066		295,677
Stream (slash)	384	5,341			13.91								384	5,341		
All stream	13,359	45,409	6,096,569		3.40	470	4,628	6,671	869,800		1.44	188	17,987	52,080	6,966,369	
All types	159,465	135,551	27,485,526		.85	173	5,448	7,241	1,046,534		1.33	192	164,913	142,792	28,532,060	

TABLE NO. 2

RECORD OF WORK DONE BY REGULAR AND NIRA CREWS - RIBES ERADICATION INLAND EMPIRE
1933

Eradication Type	Initial Eradication: Acres	Initial Eradication: Effec-tive Man Days	Initial Eradication: Total Ribes	Initial Eradication: Per Acre Basis: Man Days	Initial Eradication: Per Acre Basis: Ribes	First Mop-up: Acres	First Mop-up: Effec-tive Man Days	First Mop-up: Total Ribes	First Mop-up: Per Acre Basis: Man Days	First Mop-up: Per Acre Basis: Ribes	Total Eradication: Acres	Total Eradication: Effec-tive Man Days	Total Eradication: Total Ribes
Open reproduction	10,955	12,238	3,151,212	1.12	288	375	336	122,172	.90	326	11,330	12,574	3,273,384
Dense reproduction	3,811	2,489	323,579	.65	85	372	373	39,327	1.00	106	4,183	2,862	362,906
Open pole	7,475	3,389	727,067	.45	97	2,571	1,358	329,110	.53	128	10,046	4,747	1,056,177
Dense pole	2,751	945	163,005	.35	59	4	3	138	.75	35	2,755	948	163,143
Open mature	20,096	14,051	2,397,832	.70	119	3,510	2,571	704,341	.73	201	23,606	16,622	3,102,173
Dense mature	1,378	442	47,387	.32	34	202	227	31,937	1.12	158	1,580	669	79,324
Brush	518	1,826	612,985	3.53	1,183						518	1,826	612,985
Cut-over	1,249	1,503	1,150,779	1.20	921						1,249	1,503	1,150,779
All upland	48,233	36,883	8,573,846	.77	178	7,034	4,868	1,227,025	.69	174	55,267	41,751	9,800,871
Stream (hand)	2,403	6,126	1,663,008	2.55	692	539	653	109,292	1.21	203	2,942	6,779	1,772,300
Stream (slash)	162	2,063		12.73		24	280		11.67		186	2,343	
Stream (machine)	158	697		4.41							158	697	
All stream	2,723	8,886	1,663,008	3.27	692	563	933	109,292	1.66	203	3,286	9,819	1,772,300
All types	50,956	45,769	10,236,854	.90	202	7,597	5,801	1,336,317	.76	178	58,553	51,570	11,573,171

TABLE NO. 3

RECORD OF WORK DONE BY ECW, REGULAR AND NIRA CREWS - RIBES ERADICATION INLAND EMPIRE
1933

Eradication Type	Initial Eradication: Acres	Initial Eradication: Effec-tive Man Days	Initial Eradication: Total Ribes	Initial Eradication: Gallons Spray	Initial Eradication: Per Acre Basis: Man Days	Initial Eradication: Per Acre Basis: Ribes	First Mop-up: Acres	First Mop-up: Effec-tive Man Days	First Mop-up: Total Ribes	First Mop-up: Gallons Spray	First Mop-up: Per Acre Basis: Man Days	First Mop-up: Per Acre Basis: Ribes	Total Eradication: Acres	Total Eradication: Effec-tive Man Days	Total Eradication: Total Ribes	Total Eradication: Gallons Spray
Open reproduction	37,250	45,423	13,166,440		1.22	353	375	336	122,172		.90	326	37,625	45,759	13,288,612	
Dense reproduction	23,273	13,501	1,755,603		.58	75	372	373	39,327		1.00	106	23,645	13,874	1,794,930	
Open pole	23,887	11,222	1,968,772		.47	82	2,571	1,358	329,110		.53	128	26,458	12,580	2,297,882	
Dense pole	5,400	1,982	285,329		.37	53	4	3	138		.75	35	5,404	1,985	285,467	
Open mature	82,142	41,531	8,629,713		.51	105	4,330	3,141	881,075		.73	204	86,472	44,672	9,510,788	
Dense mature	9,534	2,075	370,586		.22	39	202	227	31,937		1.12	158	9,736	2,302	402,523	
Brush	3,446	4,243	922,728		1.23	268							3,446	4,243	922,728	
Cut-over	9,407	7,048	2,863,632		.75	304							9,407	7,048	2,863,632	
All upland	194,339	127,025	29,962,803		.65	154	7,854	5,438	1,403,759		.69	179	202,193	132,463	31,366,562	
Stream (hand)	15,378	37,117	7,759,577		2.41	505	5,167	5,335	979,092		1.03	190	20,545	42,452	8,738,669	
Stream (chemical)	3,993	9,077		251,385	2.27		1,004	1,989		44,292	1.98		4,997	11,066		295,677
Stream (slash)	546	7,404			13.56		24	280			11.67		570	7,684		
Stream (machine)	158	697			4.41								158	697		
All stream	16,082	54,295	7,759,577		3.38	505	5,191	7,604	979,092		1.46	190	21,273	61,899	8,738,669	
All types	210,421	181,320	37,722,380		.86	180	13,045	13,042	2,382,851		1.00	183	223,466	194,362	40,105,231	

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TABLE NO. 1

RECORD OF WORK DONE BY ECW CAMPS - RIBES ERADICATION INLAND EMPIRE
1933

Eradication Type	Initial Eradication						First Mop-up						Total Eradication			
	Acres	Effective Man Days	Total Ribes	Gallons Spray	Per Acre Basis: Man Days	Per Acre Basis: Ribes	Acres	Effec-tive Man Days	Total Ribes	Gallons Spray	Per Acre Basis: Man Days	Per Acre Basis: Ribes	Acres	Effec-tive Man Days	Total Ribes	Gallons Spray
Open reproduction	26,295	33,185	10,015,228		1.26	381							26,295	33,185	10,015,228	
Dense reproduction	19,462	11,012	1,432,024		.57	74							19,462	11,012	1,432,024	
Open pole	16,412	7,833	1,241,705		.48	76							16,412	7,833	1,241,705	
Dense pole	2,649	1,037	122,324		.40	46							2,649	1,037	122,324	
Open mature	62,046	27,480	6,231,881		.44	100	820	570	176,734		.70	216	62,866	28,050	6,408,615	
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Stream (hand)	12,975	30,991	6,096,569		2.39	470	4,628	4,682	869,800		1.01	188	17,603	35,673	6,966,369	
Stream (chemical)	3,993	9,077		251,385	2.27		1,004	1,989		44,292	1.98		4,997	11,066		295,677
Stream (slash)	384	5,341			13.91								384	5,341		
All stream	13,759	45,409	6,096,569		3.40	470	4,628	6,671	869,800		1.44	188	17,987	52,080	6,966,369	
All types	159,465	135,551	27,485,526		.85	173	5,448	7,241	1,046,534		1.33	192	164,913	142,792	28,532,060	

TABLE NO. 2

RECORD OF WORK DONE BY REGULAR AND NIRA CREWS - RIBES ERADICATION INLAND EMPIRE
1933

Eradication Type	Initial Eradication					First Mop-up					Total Eradication		
	Acres	Effec-tive Man Days	Total Ribes	Per Acre Basis: Man Days	Per Acre Basis: Ribes	Acres	Effec-tive Man Days	Total Ribes	Per Acre Basis: Man Days	Per Acre Basis: Ribes	Acres	Effec-tive Man Days	Total Ribes
Open reproduction	10,955	12,238	3,151,212	1.12	288	375	336	122,172	.90	326	11,330	12,574	3,273,384
Dense reproduction	3,811	2,489	323,579	.65	85	372	373	39,327	1.00	106	4,183	2,862	362,906
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Dense pole	2,751	945	163,005	.35	59	4	3	138	.75	35	2,755	948	163,143
Open mature	20,096	14,051	2,397,832	.70	119	3,510	2,571	704,341	.73	201	23,606	16,622	3,102,173
Dense mature	1,378	442	47,387	.32	34	202	227	31,937	1.12	158	1,580	669	79,324
Brush	518	1,826	612,985	3.53	1,183						518	1,826	612,985
Cut-over	1,249	1,503	1,150,779	1.20	921						1,249	1,503	1,150,779
All upland	48,233	36,883	8,573,846	.77	178	7,034	4,868	1,227,025	.69	174	55,267	41,751	9,800,871
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Stream (slash)	162	2,063		12.73		24	280		11.67		186	2,343	
Stream (machine)	158	697		4.41							158	697	
All stream	2,723	8,886	1,663,008	3.27	692	563	933	109,292	1.66	203	3,286	9,819	1,772,300
All types	50,956	45,769	10,236,854	.90	202	7,597	5,801	1,336,317	.76	178	58,553	51,570	11,573,171

TABLE NO. 3

RECORD OF WORK DONE BY ECW, REGULAR AND NIRA CREWS - RIBES ERADICATION INLAND EMPIRE
1933

Eradication Type	Initial Eradication						First Mop-up						Total Eradication			
	Acres	Effec-tive Man Days	Total Ribes	Gallons Spray	Per Acre Basis: Man Days	Per Acre Basis: Ribes	Acres	Effec-tive Man Days	Total Ribes	Gallons Spray	Per Acre Basis: Man Days	Per Acre Basis: Ribes	Acres	Effec-tive Man Days	Total Ribes	Gallons Spray
Open reproduction	37,250	45,423	13,166,440		1.22	353	375	336	122,172		.90	326	37,625	45,759	13,288,612	
Dense reproduction	23,273	13,501	1,755,603		.58	75	372	373	39,327		1.00	106	23,645	13,874	1,794,930	
Open pole	23,887	11,222	1,968,772		.47	82	2,571	1,358	329,110		.53	128	26,458	12,580	2,297,882	
Dense pole	5,400	1,982	285,329		.37	53	4	3	138		.75	35	5,404	1,985	285,467	
Open mature	82,142	41,531	8,629,713		.51	105	4,330	3,141	881,075		.73	204	86,472	44,672	9,510,788	
Dense mature	9,534	2,075	370,586		.22	39	202	227	31,937		1.12	158	9,736	2,302	402,523	
Brush	3,446	4,243	922,728		1.23	268							3,446	4,243	922,728	
Cut-over	9,407	7,048	2,863,632		.75	304							9,407	7,048	2,863,632	
All upland	194,339	127,025	29,962,803		.65	154	7,854	5,438	1,403,759		.69	179	202,193	132,463	31,366,562	
Stream (hand)	15,378	37,117	7,759,577		2.41	505	5,167	5,335	979,092		1.03	190	20,545	42,452	8,738,669	
Stream (chemical)	3,993	9,077		251,385	2.27		1,004	1,989		44,292	1.98		4,997	11,066		295,677
Stream (slash)	546	7,404			13.56		24	280			11.67		570	7,684		
Stream (machine)	158	697			4.41								158	697		
All stream	16,082	54,295	7,759,577		3.38	505	5,191	7,604	979,092		1.46	190	21,273	61,899	8,738,669	
All types	210,421	181,320	37,722,380		.86	180	13,045	13,042	2,382,851		1.00	183	223,466	194,362	40,105,231	

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It will be noted in the preceeding tables that, especially on initial work, the CCC man day appears to be approximately as effective as the regular or NIRA man day. Actually this is not the case for the following reasons:

1. In these tables a CCC man day means eight hours of actual work for one man. In other words, the total hours a CCC man actually worked at Ribes eradication, exclusive of travel and lunch time, was divided by eight to arrive at the man day figure which would campare with the regular or NIRA man day. Regular and NIRA men actually worked eight hours per day. The total full CCC man days, including lunch and travel time, was 226,004. The effective eight hour CCC man days totalled 142,792. Thus it was necessary for a CCC man to spend one and three-quarters days in the field to net eight hours of effective work.

2. During the season 38,856 of the acres listed as worked by CCC men were eliminated from actual working because advance checks by checkers showed that that acreage had few or no Ribes. Only 4,107 of the acres listed as worked by regular and NIRA men were so eliminated. By deducting the acreages eliminated by advance check in each case, it is found that the average man days per acre for all types for ECW versus regular and NIRA crews is 1.13 and .97 respectively, whereas the tables, having eliminated acreages included, show .85 and .90 respectively.

3. Acreages worked by regular and NIRA crews showed considerably more Ribes per acre on the average than did acreages worked by ECW crews.

4. Checking records show that work done by regular and NIRA crews was more efficient than work done by ECW crews.

5. Despite efforts on the part of foremen in ECW camps, a great many Ribes bushes were broken off at the ground surface leaving the crowns and roots to sprout up again. This situation did not exist to any appreciable extent on regular and NIRA work, because the men had a better understanding of the problem and were much more closely supervised by men with previous experience, whereas, on ECW crews, the foreman of 20 or 25 men was the only man with previous blister rust control experience. The regular and NIRA crews were so organized that there were at least twenty percent of the men with previous experience on blister rust control work.

The following table shows acreage eliminated from working three advance checks:

TABLE NO. 4

ACREAGE BY ERADICATION TYPES ELIMINATED FROM CREW WORK THROUGH ADVANCE CHECK

Eradication Type	Acreage Eliminated through Advance Check		
	ECW	Regular and NIRA	Total
Open reproduction	4,380	90	4,470
Dense reproduction	6,737	154	6,891
Open pole	6,436	1,665	8,101
Dense pole	1,642	124	1,766
Open mature	12,136	1,102	13,238
Dense mature	3,289	972	4,261
Brush	1,905		1,905
Cut-over	2,331		2,331
All Types	38,856	4,107	42,963

COST OF WORK

It is impossible to give a complete set of costs for ECW work. The costs of regular and NIRA work are shown in the respective reports.

INDIVIDUAL PROJECT REPORTS

All of the work done by Ribes eradication projects, both experimental and actual control, is described in detail in the following reports:

Ribes eradication - Clearwater Project.
Ribes eradication - St. Joe Project.
Ribes eradication - Coeur d'Alene Project.
Methods of Chemical Eradication.
Ribes and Associated Brush Removal by Bulldozer.
Preeradication Survey - Inland Empire.

The following reports appear under the respective states:

Ribes Eradication - Savenac Nursery, Montana
Blister Rust Control Activities - Mount Rainier National Park, Washington.
Ribes Eradication - Rougue River National Forest, Oregon.
Preeradication Survey - Rogue River National Forest, Oregon.

CHECKING ON BLISTER RUST CONTROL AREAS IN THE INLAND EMPIRE

By

Herman E. Swanson, Agent

PURPOSE AND METHOD

In view of the fact that checking is performed during the same season that the eradication work is done, the true purpose of checking is something outside of the mere showing of the amount of Ribes remaining on an area. If this were its sole purpose, it would preferably be done the following year when resprouts from roots and crowns left in the ground have had an opportunity to appear. On the other hand, checking has a more useful purpose directly connected with the conduct of the eradication work.

The checking work was carried on to give the Ribes eradication forces immediate and detailed information on the amount and distribution of Ribes on the control areas both in advance of the crews and following crew work to facilitate progress and to insure efficient work.

The areas were checked by taking parallel sample strips 13.2 feet in width over the area at five chain intervals. This represented a 4-percent check. Data were recorded along this strip and were later plotted on a map. These maps showed the distribution of Ribes over the area. In the case of advance checking, it was possible to eliminate areas low in Ribes population from crew work, and in the case of checking areas worked by crews, it was possible to determine those portions which required reworking.

ORGANIZATION

The checking organization consisted of:

1 Checking supervisor.
3 Operation checking supervisors.
1 Assistant operation checking supervisor.
40 Checker foremen.
127 Checkers.

The checking personnel cooperated to the fullest extent with the eradication forces. At such times as they were not engaged on regular checking work, they worked in any way possible on Ribes eradication. The following is a man-day analysis of the checker's time:

Checking Activities	Man-Days	% of Total Man-Days
Checking Worked Areas	4,825	41
Advance Checking	1,575	13
Compiling Data & Maps	862	7
Training and Supervision	1,105	9

Eradication Activities	Man-Days	% of Total Man-Days
Supervising Crew Work	1,220	10
Reworking Areas	448	4
Training Crew Men	420	4
Special Field Assistance	1,499	12
Total on Checking Activities	8,367	70
Total on Eradication Activities	3,587	30
Total Checking and Eradication	11,954	100

RESULTS

Tables showing the results of the checking work appear with each of the Ribes eradication reports on the following projects:

1. Clearwater National Forest and Clearwater Timber Protective Association.
2. St. Joe National Forest and Potlatch Timber Protective Association.
3. Coeur d'Alene National Forest.
4. Savenac Nursery, Haugan, Montana.

CHEMICAL ERADICATION METHODS, 1933

Orogrande Creek - Clearwater National Forest
Clarkia, Idaho - St. Joe National Forest

H. E. Swanson
Agent

INTRODUCTION

The program of the chemical eradication methods unit consisted of a check on experimental work performed in 1933 on Orogrande Creek, Clearwater National Forest and of a large scale trial of eradicating *Ribes inerme* with chemicals. In addition, further experimentation with chemicals and methods of application was carried on at Clarkia, Idaho.

I. Results of the Work Performed on Orogrande Creek.

1. Plot studies testing the effectiveness of sodium chlorate and ammonium thiocyanate solutions when applied to the aerial portion of the Ribes bushes and to the soil, and when applied to the soil only; follow-up treatments on these plots one year after original treatments.

2. Plots studies testing effectiveness of ammonium thiocyanate applied in dry form.

3. Studies on individual *R. inerme* bushes testing effectiveness of sodium chlorate solutions and methods of application.

4. Extensive work testing various solutions of sodium chlorate and ammonium thiocyanate.

II. Outline of Work Performed at Clarkia, Idaho

It was not possible to make a satisfactory check on the results of this work. A table is presented showing the experiments performed.

ORGANIZATION AND COST OF WORK.

The crew engaged on the experimental work on Orogrande Creek, Clearwater National Forest consisted of a supervisor and six additional men. The cost of the work including all charges from Jan. 1, 1933 to Dec. 31, 1933, was $4,010.33.

At Clarkia, Idaho, the experimental crew consisted of a supervisor and ten additional men. The cost of work including all charges from Janl, 1933 to Dec. 31 1933 was $4,614.66.

WORK PERFORMED AND RESULTS

I. Plot studies testing aerial spraying and soil drenches with sodium chlorate and ammonium thiocyanate.

The results of these studies are shown in Tables No. 1, No. 2, No. 3, and Chart No. 1. In general, the lighter aerial sprays with sodium chlorate, comprising an application of a five per cent solution at the rate 2 to 4 pounds of chemical per square rod are more effective in June and early July. During the course of the season, aerial treatments became less effective and soil applications give more satisfactory results. Soil drenches require more solution and the amounts required to obtain a satisfactory kill increase as the season progresses. Apparently a satisfactory kill can not be obtained after the middle of August, without a very heavy application.

Sodium chlorate treatments are apparently more satisfactory than ammonium thiocyanate until amounts in excess of 8 pounds of chemical per square rod are applied. Since such amounts are economically out of the question on the first treatment of an area, it is preferable to use sodium chlorate sprays and to perform the work before the middle of July. For mop-up work the following year, when the area is opened up and a certain percentage of the R. inerme has been killed, it is advisable to use ammonium thiocyanate in heavy applications because of the relatively small portion of the area that must be treated. This is pointed out in the following section of this report.

The amount of kill on R. inerme resulting from second treatments with sodium chlorate applied during the same season as the initial treatment is relatively small. The kill resulting from the second applications with ammonium thiocyanate on areas previously treated with this chemical was slightly greater than in the case of sodium chlorate. As a whole, more effective results can be obtained by delaying second treatments on R. inerme areas until the following season. At this time it is possible to confine the treatments to those bushes surviving through the winter.

TABLE NO. 1

EFFECTIVENESS OF SODIUM CHLORATE SOLUTIONS ON RIBES INERME
OROGRANDE CREEK

Series	Date of First Treatment	Gals Water Per Sq. Rod	Percent R. inerme Bushes Killed											
			Sodium Chlorate											
			Soil						Aerial and Soil					
			Pounds Per Square Rod						Pounds Per Square Rod					
			2		4		8		2		4		8	
			S	R	S	R	S	R	S	R	S	R	S	R
1.	June 25 to July 6	4	50	0	17	12	44	100	84	68	*100	89	38	50
		8	0	30	13	29	14	83	77	71	30	79	26	45
		16	33	11	0	63	20	35	*50	75	73	71	20	79
		32	20	27	29	35	32	32	77	73	82	71	78	68
		Av.	26	17	15	35	28	63	72	72	71	78	41	61
2.	July 21	4	9	75	70	94	67	71	12	52	53	77	*100	*100
		8	12	88	40	42	55	*100	67	50	47	77	61	89
		16	13	33	100	100	80	100	16	87	5	100	83	100
		32	29	83	92	69	83	100	0	42	20	71	89	100
		Av.	16	70	76	76	71	93	24	58	31	81	83	97
3.	July 27	4	21	78	77	58	68	88	65	77	87	75	90	90
		8	46	88	100	84	64	100	77	77	78	60	79	76
		16	26	61	80	50	50	100	34	82	78	42	100	89
		32	76	26	92	42	*75	100	88	36	92	80	33	85
		Av.	42	63	87	59	64	97	66	68	84	64	76	85
4.	Aug. 20	4	-	-	-	-	-	-	24	-	23	-	46	-
		8	-	-	-	-	-	-	15	-	8	-	61	-
		16	-	-	-	-	-	-	13	-	18	-	41	-
		32	-	-	-	-	-	-	12	-	24	-	32	-
		Av.							16	-	18	-	45	-

Treatments made 1932. Results checked 1933.

S - Single application.
R - Respray August 20, to Sept.1.
* - Less than 5 bushes.

Respray treatments per square rod.
Series 1. 2 lbs. chemical in 4 gals. water.
Series 2. 2 lbs. chemical in 8 gals. water.
Series 3. 4 lbs. chemical in 8 gals. water.

TABLE NO. 2

EFFECTIVENESS OF AMMONIUM THIOCYANATE SOLUTIONS ON RIBES INERME
OROGRANDE CREEK

series	Date of First Treatment	Percent R. inerme Bushes Killed															
		Ammonium Thiocyanate															
		Soil								Aerial and Soil							
		Pounds Per Square Rod								Pounds Per Square Rod							
		2		4		8		16		2		4		8		16	
		S	R	S	R	S	R	S	R	S	R	S	R	S	R	S	R
1	June 20 to 25	6	40	21	87	22	47	-	-	0	60	10	93	47	77	-	-
		10	67	8	46	47	100	-	-	29	33	20	100	47	90	-	-
		9	60	17	54	63	100	-	-	45	100	6	81	43	100	-	-
		9	67	14	50	90	100	-	-	8	71	50	53	33	64	-	-
		9	59	15	59	56	87	-	-	21	66	22	82	43	83	-	-
2	July 7 to 19	30	100	43	78	41	100	-	-	60	100	100	100	75	100	-	-
		0	100	30	100	50	100	-	-	77	100	48	89	70	93	-	-
		36	88	8	80	53	100	-	-	21	100	33	100	88	100	-	-
		19	75	18	78	*75	100	-	-	43	*100	*100	83	65	94	-	-
		21	91	25	84	55	100	-	-	50	100	70	93	75	97	-	-
3	August 2	-	-	9	70	70	90	100	*100	-	-	18	100	33	90	76	100
		-	-	40	100	23	91	*100	100	-	-	22	100	36	90	71	100
		-	-	*67	100	69	*100	89	100	-	-	35	80	77	85	70	*100
		-	-	15	92	32	92	80	80	-	-	*0	60	29	100	90	100
		-	-	33	91	49	93	92	95	-	-	19	85	44	91	77	100

Treatments made 1932. Results checked 1933.
S - Single Application
R- Respray August 20 to September 1.
* - Less than 5 bushes.

Respray treatments per square Rod
Series 1 - 4 lbs. Chemical in 8 gals. water
Series 2 - 8 lbs. Chemical in 8 gals. water
Series 3 - 8 lbs. Chemical in 8 gals. water

CHART NO. 1

CURVES SHOWING SEASONAL VARIATION IN THE PERCENT OF RIBES INERME - BUSHES KILLED WITH APPLICATIONS OF SODIUM CHLORATE AND AMMONIUM THIOCYANATE

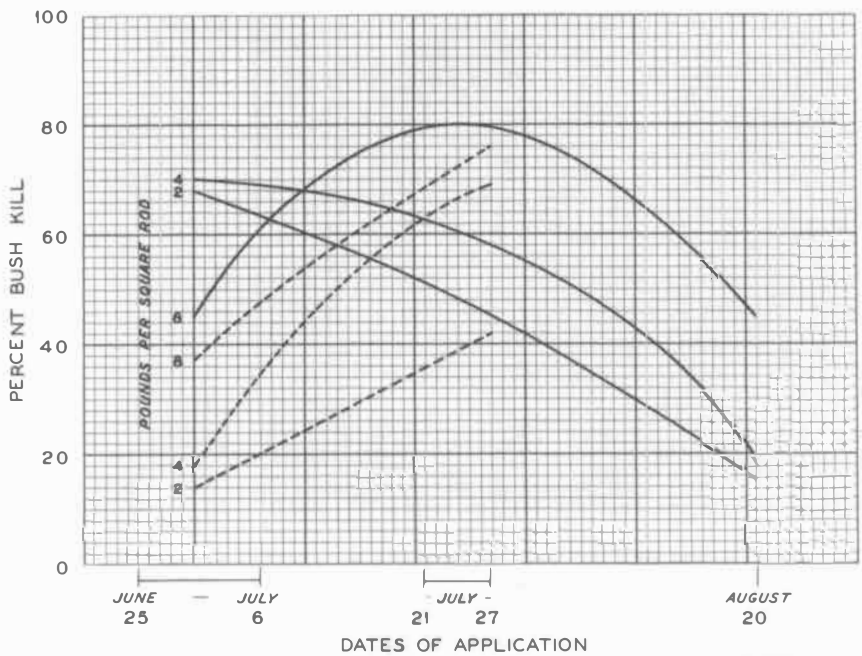
DATA FROM TABLE NO. 3

- LEGEND -

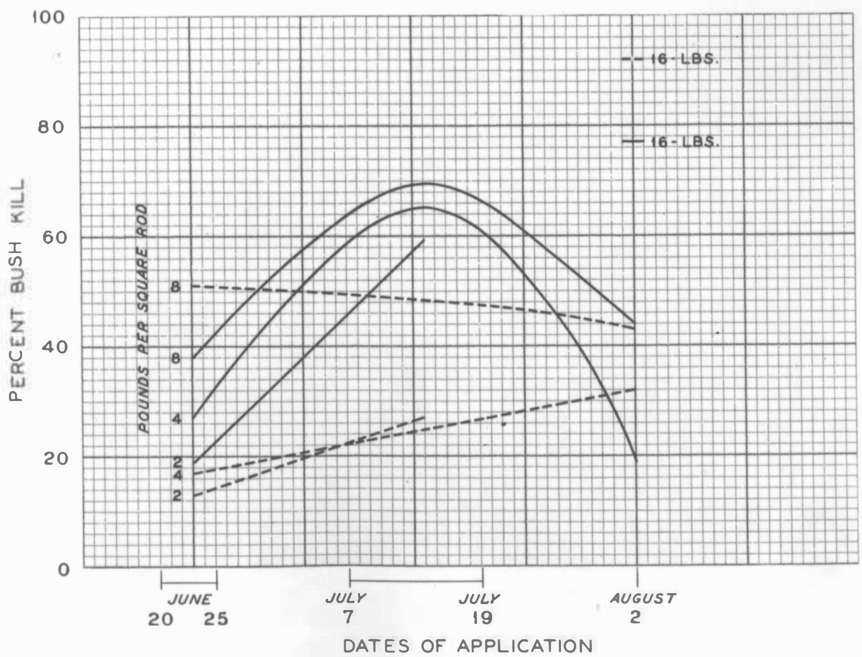
—— AERIAL AND SOIL TREATMENT

- - - - SOIL TREATMENT ONLY

SODIUM CHLORATE



AMMONIUM THIOCYANATE



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W.1104. Before treatment. Sodium chlorate applied as aerial spray and soil drench at rate of 1,280 pounds in 2,560 gallons of water per acre. July 19, 1932.

W-1104-2. One year after treatment. August 1, 1933.

W-1103. Before treatment. Ammonium thiocyanate applied as aerial spray and soil drench at rate of 1,280 pounds in 2,560 gallons of water per acre. July 19, 1932.

W-1103-2. One year after treatment. August 1, 1933.

TABLE NO. 3

EFFECTIVENESS OF SINGLE APPLICATION OF SODIUM CHLORATE AND AMMONIUM THIOCYNATE SOLUTIONS ON R. INERME BUSHES.

Series	Gals. Water Per Sq. Rod	Percent R. inerme Bushes Killed													
		Sodium Chlorate						Ammonium Thiocyanate							
		Soil			Aerial and Soil			Soil				Aerial and Soil			
		Pounds Per Sq. Rod			Pounds Per Sq. Rod			Pounds Per Sq. Rod				Pounds Per Sq. Rod			
		2	4	8	2	4	8	2	4	8	16	2	4	8	16
1	4	18	7	65	72	90	40	3	34	14	-	6	47	38	-
	8	8	14	41	70	50	31	18	7	53	-	7	36	44	-
	16	15	24	15	58	68	45	14	15	61	-	48	19	47	-
	32	16	25	25	71	72	69	18	12	75	-	15	27	24	-
	Avr.	14	18	37	68	70	46	13	17	51	-	19	27	38	-
2	4	29	69	56	16	49	84	36	31	41	-	64	84	71	-
	8	37	28	64	42	46	59	21	36	46	-	72	52	65	-
	16	10	87	77	35	36	75	33	15	47	-	44	50	78	-
	32	43	67	78	5	29	78	18	19	58	-	55	75	63	-
	Avr.	30	63	69	25	40	74	27	25	48	-	59	65	69	-
3	4	45	63	74	67	77	86	-	10	52	98	-	26	38	77
	8	63	88	78	73	65	73	-	41	29	98	-	28	40	74
	16	39	61	71	54	56	90	-	54	56	92	-	24	58	74
	32	47	63	83	58	82	55	-	24	34	78	-	0	41	84
	Avr.	48	69	76	63	70	76	-	32	43	92	-	19	44	77
4	4	-	-	-	24	23	46	-	-	-	-	-	-	-	-
	8	-	-	-	15	8	61	-	-	-	-	-	-	-	-
	16	-	-	-	13	18	41	-	-	-	-	-	-	-	-
	32	-	-	-	12	24	32	-	-	-	-	-	-	-	-
	Avr.	-	-	-	16	18	45	-	-	-	-	-	-	-	-

Note: 1. Data from Tables No. 1 and No. 2.

2. The percent kills with single application in this table are based on the combined data of the results on the plots given a single treatment and those given two treatments. In combining the data the effect of the second treatment was taken out of the results.

II. Results of second applications of sodium chlorate and ammonium thiocyanate to *R. inerme* bushes surviving treatments of the same chemicals applied during the previous year.

These treatments constituted a heavy dosage to the crowns and roots of the surviving bushes. Since there was only a small amount of living stem on these bushes, the treatment represented a soil application at the point the resprouting was taking place Since the results were checked at the close of the season, it is possible that some of the surviving bushes may die later. The greater percentage of them were very severely injured by the treatment.

As the data show a 93 percent and 94 percent kill of the bushes, this represents very satisfactory results from a practical standpoint. Only a nominal cost would be involved to mop up these areas by hand-pulling methods.

The final results on these areas from the two applications made in successive years represents approximately a 99 percent kill of the total number of *R. inerme* bushes originally on the area.

For this second treatment, the results show ammonium thiocyanate to be more effective perpound of chemical. See Table No. 4

TABLE NO. 4

RESULTS OF A SECOND APPLICATION OF CHEMICALS TO SURVIVING R. INERME BUSHES, TREATMENTS OF THE SAME CHEMICAL APPLIED DURING THE PREVIOUS YEAR OROGRANDE CREEK

Chemical	Acres in Area	Sq. Ft. of area Treated	Pounds Chemical	R. inerme Bushes Treated in 1933	Bushes Surviving Treatment		Pounds Chemical	
					No.	F.L.S.	Per Sq. ft.	Per Bush
Sodium Chlorate	1.2	4,208	625	990	66	44	.15	.63
Ammonium Thiocyanate	0.9	2,769	306	1,003	61	92	.11	.31

Second Treatment - July 21-28, 1933
Results Checked - Oct. 6, 1933.

III. Application of ammonium thiocyanate in dry form.

Applications of ammonium thiocyanate in dry form are not as effective pound for pound as when applied in solution. It is difficult to obtain proper distribution over the ground of the dry chemical. It is possible in applying chemical in solution to apply it directly at the proper points and secure uniform distribution in order to contact all the roots.

TABLE NO. 5

EFFECTIVENESS OF AMMONIUM THIOCYANATE APPLIED IN DRY FORM
OROGRANDE CREEK

Size of Plot	Pounds Chemical Per Sq. Rod	Results on R. inerme					
		Dead				Alive	
		Bushes		Stem		Number Bushes	Feet Stem
		No	Percent	Feet	Percent		
1 Sq. rod	32	17	89.5	503	96.7	2	17
1 Sq. rod	16	24	66.7	504	92.1	12	45
1 Sq. rod	8	13	59.1	491	91.3	9	47

Chemical applied July 20, 1932.
Plots checked June 23, 1933.

IV. Results of treatments on individual Ribes inerme bushes treated with a 10 percent solution of sodium chlorate. See Table No. 6.

The results of this experiment tend to show how effectively R. inerme bushes can be killed when treated carefully and thoroughly with sodium chlorate.

The experimental method used in this study was a treatment with water of the leaves and stems of 10 R. inerme bushes sufficiently to cause them to drip. In Table No. 6 this is referred to as an X treatment. The amount required for each bush was recorded and on the following day this same amount of a 10 percent solution of sodium chlorate was applied carefully about the crown of the bush. All but one of the bushes were killed. Similarly the amounts required to spray the leaves and stems of R. inerme bushes sufficiently to cause them to drip and in addition to start to form puddles on the ground at the base of the bushes was measured with water and recorded for each bush. In Table No. 6 this is referred to as a Y treatment. On the following day, this amount of a 10 percent solution of sodium chlorate was applied entirely about the crowns of the bushes and all but one of the ten were killed. In addition, 10 R. inerme were sprayed applying this treatment to the aerial portions of the bush and to the soil. The entire 10 bushes were killed. The experiment was continued increasing these Y treatments 2, 4, and 6 times, using soil applications only on groups of 20 bushes, and using aerial and soil applications combined on other groups. All bushes were killed with the exception of 2 bushes given the 2Y treatment to the soil and 2 bushes given the 2Y treatment over the entire plant.

Bushes were treated August 3 to 13, 1932 and results checked July 6, 1933. The feet of stem shown in Table No. 6 for each bush was that dead stem present at the time the check was made.

TABLE NO. 6

RESULTS ON INDIVIDUAL R. INERME BUSHES TREATED WITH SODIUM CHLORATE
(1 POUND CHEMICAL PER GALLON WATER)

	Soil Application			Aerial and Soil Application				Soil Application			Aerial and Soil Application		
Treatment	Gallons	Feet of Stem	Result	Gallons	feet of Stem	Result	Treatment	Gallons	Feet of Stem	Result	Gallons	Feet of Stem	Result
X	.11	22	K	-	-	-	2Y	.43	25	K	1.13	60	K
X	.08	14	K	-	-	-	2Y	.45	15	K	.86	24	K
X	.31	40	K	-	-	-	2Y	.26	22	K	.52	15	K
X	.19	15	K	-	-	-	2Y	.74	45	K	.56	26	K
X	.19	14	K	-	-	-	2Y	.35	14	K	.69	14	K
X	.09	18	K	-	-	-	2Y	.69	40	K	.35	14	K
X	.26	27	N.K.	-	-	-	2Y	.69	30	K	.43	18	K
X	.23	24	K	-	-	-	2Y	.61	18	N.K.	.65	20	K
X	.26	30	K	-	-	-	2Y	.65	26	N.K.	.39	8	K
X	.17	10	K	-	-	-	2Y	.91	29	K	.75	23	K
Y	.30	20	K	.37	22	K	2Y	.61	42	K	1.14	38	N.K
Y	.26	12	K	1.39	52	K	2Y	.30	12	K	1.30	41	K
Y	.19	14	K	.21	23	K	2Y	.35	19	K	.62	21	K
Y	.43	18	N.K.	.53	66	K	2Y	.65	33	K	1.24	38	K
Y	.26	16	K	.78	105	K	2Y	.91	45	K	.93	30	K
Y	.14	14	K	.61	57	K	2Y	.74	42	K	.50	10	K
Y	.13	14	K	.41	46	K	2Y	.39	22	K	.62	21	K
Y	.24	36	K	.75	79	K	2Y	.65	33	K	.98	52	N.K
Y	.21	18	K	.74	47	K	2Y	.56	27	K	-	-	-
Y	.17	31	K	.28	45	K	-	-	-	-	-	-	-
4Y	2.56	52	K	1.21	32	K	6Y	3.12	29	K	1.00	12	K
4Y	.82	10	K	1.73	25	K	6Y	1.01	23	K	2.60	12	K
4Y	1.01	22	K	.78	18	K	6Y	.91	18	K	1.30	19	K
4Y	2.16	44	K	.95	17	K	6Y	1.18	22	K	.91	13	K
4Y	1.38	22	K	.61	27	K	6Y	1.30	18	K	1.30	27	K
4Y	.78	18	K	1.40	22	K	6Y	1.01	27	K	1.43	30	K
4Y	.69	27	K	3.00	40	K	6Y	1.18	21	K	2.72	31	K
4Y	1.55	33	K	1.30	33	K	6Y	1.30	30	K	2.18	31	K
4Y	.78	40	K	2.60	50	K	6Y	1.18	17	K	2.65	36	K
4Y	2.07	105	K	.69	12	K	6Y	.91	10	K	1.71	25	K
4Y	1.21	33	K	.62	8	K	6Y	1.30	11	K	1.55	28	K
4Y	1.01	24	K	1.76	12	K	6Y	1.43	17	K	1.09	24	K
4Y	.95	23	K	.64	15	K	6Y	1.01	12	K	1.55	24	K
4Y	.86	50	K	2.07	18	K	6Y	1.01	18	K	1.41	29	K
4Y	.61	26	K	1.55	22	K	6Y	1.43	23	K	3.27	30	K
4Y	.95	42	K	.83	11	K	6Y	1.01	15	K	1.71	22	K
4Y	.69	24	K	1.55	23	K	6Y	1.55	38	K	2.28	22	K
4Y	.69	14	K	.62	18	K	6Y	3.11	23	K	-	-	-
4Y	.78	22	K	.62	31	K	6Y	1.30	11	K	-	-	-
	-	-	-	-	-	-	6Y	1.81	45	K	-	-	-

X - Volume required to cause leaves and stems to drip.
Y - Treatment X plus volume required to start to form puddles on ground.
K - Bush killed. N.K. - Bush not killed.

V. Extensive work treating heavy Ribes inerme areas with sodium chlorate solutions.

During the seasons of 1931, 1932, and 1933 a crew was engaged in eradicating R. inerme on Orogrande Creek. A power sprayer was used to apply solutions of sodium chlorate to the Ribes. Various methods of treatment were used from an aerial spray to a broadcast drench of the entire area. The most satisfactory method from the standpoint of costs proved to be a combined application to the aerial parts of the bushes and to the ground representing the distribution of the roots. Selective work, in which only Ribes were treated, was more satisfactory than the broadcast applications in which the solution was sprayed out over the entire area without concentrating on the individual bushes or clumps of bushes.

Table No. 7 shows a cost analysis on a per acre basis of the work that was necessary to finally suppress the R. inerme on 13 different areas ranging from 1 acre to 32 acres in size.

VI. Extensive work with ammonium thiocyanate on Ribes petiolare and R. lacustre.

This experiment was principally conducted to compare the effectiveness of ammonium thiocyanate and sodium chlorate on R. petiolare. Altho the purpose was to treat the bushes in the same manner as regular spraying crews treat R. petiolare with sodium chlorate, the ammonium thiocyanate was applied in greater amounts than is generally done on regular spraying work. The results of these treatments are not as favorable as those secured with sodium chlorate applied in lesser amounts by regular spray crews. See Table No. 8.

TABLE NO. 7

COST ANALYSIS OF TREATMENT OF HEAVY RIBES INERME AREAS WITH SODIUM CHLORATE
(DATA ON PER ACRE BASIS)

No. of Acres in Area	First Treatment								Second Treatment										Mop-up			Total Cost Per Acre
						Cost			Chemical Work					Hand Work		Average Cost Over Entire Area						
	Date	Method	Per-cent Solu-tion	Lbs. Chem-ical	Man Days	Chem-ical	Labor	Total	Date	No. Acres	Percent Solu-tion	Lbs. Chem-ical	Man Days	No. Acres	Man Days	Chem-ical	Labor	Total	Date of Work	Man Days	Cost	
32	1931	S	10	157	5.0	$12.56	$29.65	$ 42.21	8/33	16	10	143	1.0	16	1.0	$ 5.72	$ 5.43	$11.15			$4.00 E	$ 57.36
16	7/32	B	10	493	4.4	39.44	26.09	65.53	8/33	6	10	244	1.4	10	0.9	7.32	5.88	13.20			4.00 E	82.73
16	9/32	B	10	493	4.4	39.44	26.09	65.53	7/33	6	10	108	1.9	10	0.9	3.24	7.00	10.24			4.00 E	79.77
1	9/32	B	10	571	2.3	45.68	13.64	59.32	7/33	0.5	10	66	1.9	0.5	0.9	2.64	7.85	10.49			2.00 E	71.81
19	8/31	S	5	100	4.0	8.00	23.72	31.72	7/32	19	10	118	2.8			9.44	16.60	26.04	9/33	0.9	4.44	62.20
9	8/31	S	5	100	4.0	8.00	23.72	31.72	7/32	9	10	* 56	2.0			4.48	11.86	16.34	9/33	0.3	1.48	49.54
5	9/32	B	5	357	2.0	28.56	11.86	40.42	7/33	5	10	172	1.9			13.76	11.27	25.03			4.00 E	69.45
1	9/32	B	2½	882	6.6	70.56	39.14	109.70	7/33	1	10	15	0.5			1.20	2.97	4.17			4.00 E	115.87
2	9/32	B	2½	311	4.1	24.88	24.31	49.19	8/33	2	10	158	1.0			12.64	5.93	18.57			4.00 E	71.76
6	7/32	B	1½	557	5.9	44.56	34.99	79.55	8/33	2	10	570	1.4	4	0.9	15.20	5.72	20.92			4.00 E	104.47
2	7/32	B	1½	686	4.3	54.88	25.50	80.38	8/33	1	10	407	1.4	1	0.9	16.28	5.87	22.15			4.00 E	106.53
2	7/32	B	1½	785	6.0	62.80	35.58	98.38	7/33	2	10	741	1.4			59.28	8.30	67.58			4.00 E	169.96
1	7/32	B	1½	1,020	7.2	$81.60	$42.70	$124.30	7/33	1	10	385	1.4			$30.80	$8.30	$39.10			$4.00 E	$167.40

*Ammonium thiocyanate.
B Broadcast treatment.
E Estimated cost on basis of inspection made after last work.
S Selective treatment, spraying Ribes only.
Cost basis:
Chemical - $.08 per pound
Man day spraying - $5.93
Man day hand pulling - $4.93

TABLE NO. 8.

RESULTS OF EXTENSIVE WORK WITH AMMONIUM THIOCYANATE ON RIBES PETIOLARE AND RIBES LACUSTRE

Date of Application 1932	Gross Size of Plot in Acres	Chemical Per Acre		R. petiolare						R. lacustre					
				Dead				Alive		Dead				Alive	
				Bushes		Stem				Bushes		Stem			
		Lbs	Gals.	No.	Per Cent	Feet	Per Cent	No. Bu.	Feet Stem	No.	Per Cent	Feet	Per Cent	Number Bushes	Feet Stem
June 23-25	0.5	270	540	176	29.9	3,455	40.6	413	5053	9	33.3	320	63.7	18	192
June 27 July 8	0.7	857	857	1,104	94.4	45,700	99.4	65	269	775	90.0	26,520	98.8	86	323
July 9-16	1.2	700	467	849	97.0	42,656	99.9	26	37	385	96.3	17,203	99.7	15	50
Aug. 1-5	0.55	836	836	667	88.3	35,159	99.2	88	269	92	86.8	1,935	98.5	14	30
Aug. 5-10	1.1	682	456	365	92.2	10,492	97.0	31	325	426	95.1	10,153	99.4	22	62

Plots checked June 26, 1933.
Shake Creek. (Orogrande drainage)

VII. Extensive work performed at Clarkia, Idaho.

A. Purpose.

1. To compare the effectiveness of Atlacide and ammonium thiocyanate on *R. inerme* and *R. petiolare*, and in so far as possible on *R. lacustre*, applied as a spray and surface drench, using general field methods of application.

2. To compare the effectiveness of several different dosages and concentrations of each chemical.

3. To compare the effectiveness of two treatments of chemical applied in one season with a long period between each treatment, with the effectiveness of a single application of a larger quantity of chemical.

4. To test the effectiveness of mixtures of Atlacide and zinc chloride.

5. To formulate a set of instructions readily usable by the eradication forces for applying specified dosages of chemical per unit of area.

B. The applications as made are shown in Table No. 9.

TABLE NO. 9

FIELD TESTS WITH ATLACIDE, AMMONIUM THIOCYANATE
AND MIXTURES OF ATLACIDE AND ZINC CHLORIDE

Plot No.	Schedule per Acre 100 Percent Coverage			Actual Field Application												
										Data on Per Acre Basis						
										Gross Area					Actual Ribes Area	
										Man Days						
	Chemical	Pounds of Chemical	Gallons of Solution	Gross Acres in Plot	Acres of Ribes	Date of First Spray	Date of Respray	Total Pounds Chemical	Total Gallons Solution	1st Spray	Respray	Total	Pounds Chemical	Gallons Solution	Pounds Chemical	Gallons Solution
1-A	Atlacide	750	500	3.67	1.54	7-12-33 7-29-33	8-28-33 9-4-33	2,364	1,576	5.8	3.1	8.9	644	429	1,535	1,023
2-A	Atlacide	1,125	500	2.87	1.29	7-31-33 8-11-33	8-28-33 9-3-33	2,957	1,314	4.7	2.6	7.3	1,030	458	2,292	1,019
3-A	Atlacide	1,500	1,000	4.36	1.15	8-12-33 8-26-33	9-4-33 9-12-33	3,411	2,274	3.0	2.2	5.2	782	522	2,966	1,977
4-A	Atlacide	3,000	1,000	2.94	1.04	7-15-33 7-31-33		3,180	1,053	5.2		5.2	1,082	358	3,058	1,013
5-A	Atlacide	5,250	2,000	3.23	1.19	7-31-33 8-14-33		6,217	2,391	4.4		4.4	1,925	740	5,224	2,009
6-A	Atlacide	7,500	2,000	2.51	.994	8-16-33 8-29-33		7,515	2,004	3.4		3.4	2,994	798	7,560	2,016
1-NH	Ammonium Thiocyanate	500	500	2.71	1.39	7-12-33 7-28-33	8-28-33 9-3-33	1,397	1,397	5.6	2.9	8.5	515	515	1,005	1,005
2-NH	Ammonium Thiocyanate	750	500	2.12	1.03	7-29-33 8-11-33	8-28-33 9-3-33	1,542	1,028	4.5	2.4	6.9	727	485	1,497	998
3-NH	Ammonium Thiocyanate	1,000	1,000	1.69	.98	8-11-33 8-25-33	9-4-33 9-11-33	1,973	1,973	4.0	2.1	6.1	1,167	1,167	2,013	2,013
4-NH	Ammonium Thiocyanate	2,000	1,000	2.37	1.09	7-15-33 7-30-33		2,188	1,094	5.3		5.3	924	462	2,007	1,004
5-NH	Ammonium Thiocyanate	3,500	2,000	3.17	1.16	7-29-33 8-13-33		4,084	2,334	4.3		4.3	1,288	736	3,521	2,012
6-NH	Ammonium Thiocyanate	5,000	2,000	2.07	1.02	8-15-33 8-28-33		5,075	2,030	3.1		3.1	2,452	981	4,975	1,990
1-ZN	Zinc chloride Atlacide	300 1,600		2.78	.829	9-7-33 9-10-33		251 1,339	837	2.9		2.9	90 482	301	303 1,615	1,010
2-ZN	Zinc chloride Atlacide	600 1,000		1.65	.663	9-11-33 9-13-33		395 659	659	2.5		2.5	239 399	399	596 994	994
3-ZN	Zinc chloride Atlacide	800 800		1.26	.273	9-14-33 9-19-33		212 212	265	2.2		2.2	168 168	210	777 777	971
4-ZN	Zinc chloride Atlacide	300 1,600		1.41	.747	8-23-33		50 264	165	9.9		9.9	35 187	117	67 353	221
5-ZN	Zinc chloride Atlacide	600 1,000		3.26	1.565	8-24-33		85 142	142	3.7		3.7	26 44	44	54 91	91
6-ZN	Zinc chloride Atlacide	800 800		1.09	.403	8-25-33		60 60	75	7.3		7.3	55 55	69	149 149	186

1. On plots 1-A, 2-A, 3-A, 1-NH, 2-NH, and 3-NH, areas of approximately 4,356 square feet of Ribes petiolare were not resprayed.
2. Plots 4-$ZnCl_2$, 5-$ZnCl_2$ and 6-$ZnCl_2$ were treated by crews from CCC camp Number 46.

RIBES AND ASSOCIATED BRUSH REMOVAL BY BULLDOZER

By
John F. Breakey
Agent

In 1929, brush elimination as a means of permanent Ribes suppression for the control of white pine blister rust was started at Savenac Nursery. Two methods were used in the experiments: hand slashing to be followed by broadcast burns; hand slashing and piling for burning. In 1931 a track laying tractor with a trail building blade mounted on a bulldozer frame, was used on a small scale to uproot and pile vegetation on areas of heavy *Ribes inerme*. In 1932, about 60 acres were cleared by tractor on the St. Maries River near Clarkia, Idaho. In addition, clearing was also done near the Honeysuckle Ranger Station on the Coeur d'Alene National Forest. The information gathered in these two experiments demonstrated that Ribes and brush can be removed by heavy machines at a cost as low as by other established methods.

DESCRIPTION OF AREAS

During the 1933 field season, beginning July 15 and ending November 1, a total of 158 acres was cleared by the bulldozer method on the Coeur d'Alene National Forest. All of the clearing was done on the Little North Fork of the Coeur d'Alene River, with the exception of 47.50 acres done at the Magee Ranger Station on Tepee Creek. Clearing and burning were done on 28.25 acres at Picnic Creek flats, and on 23 acres near the Honeysuckle Ranger Station. In addition, 10.10 acres at the junction of Burnt Cabin Creek and the North Fork of the Coeur d'Alene River, and 49.15 acres in the vicinity of the Horse Heaven Ranger Station were cleared.

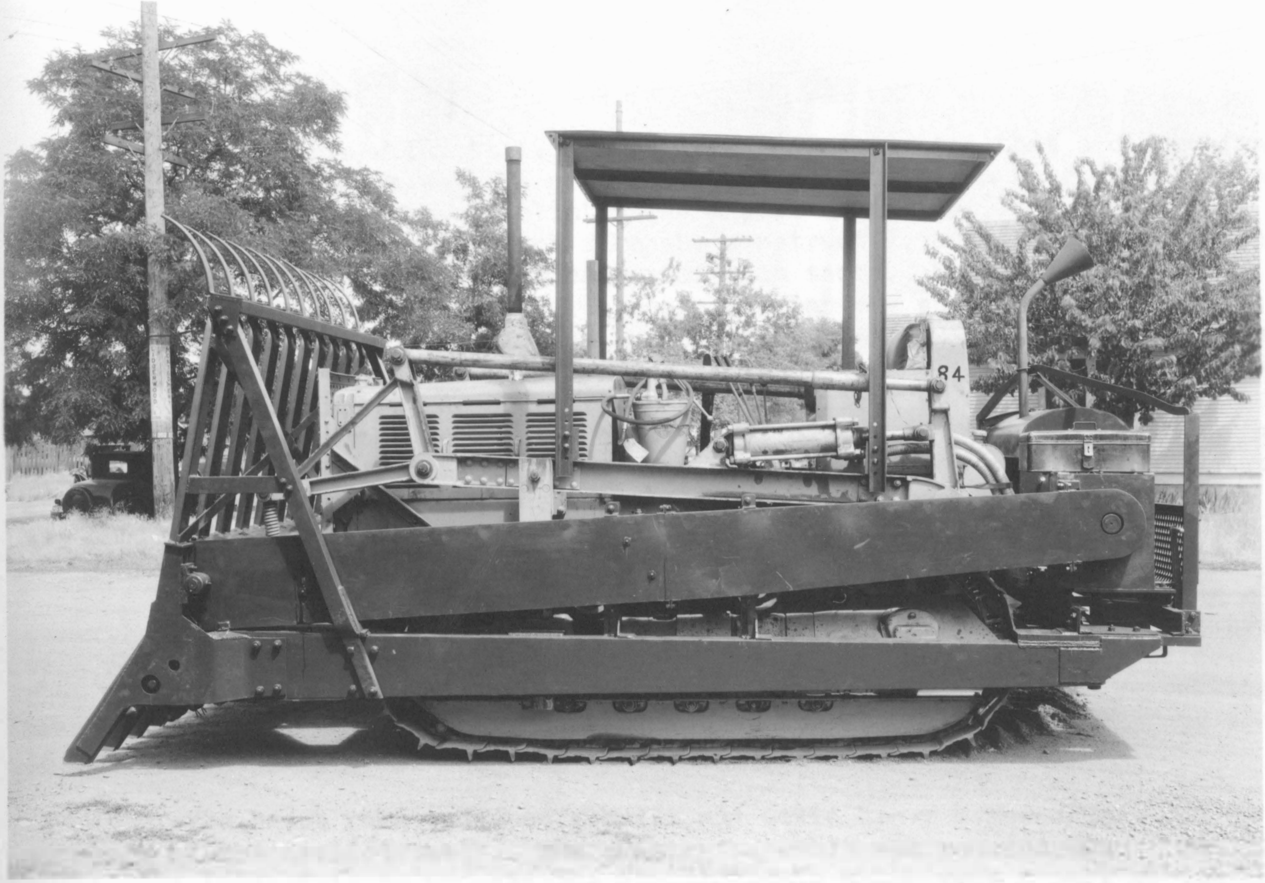
Each area contained a number of beaver dams which were removed at least ten days before the machine covered the ground.

DESCRIPTION OF MACHINE

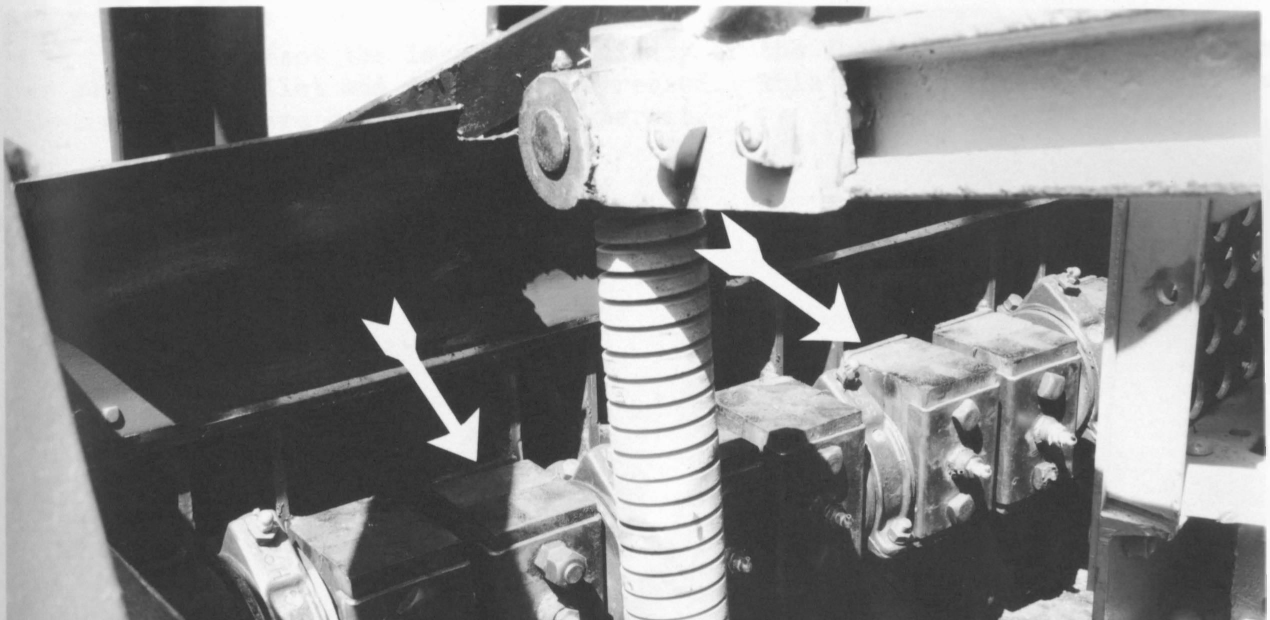
The machine used was a Caterpillar 50 gasoline tractor equipped with a master bulldozer frame and lift, special 18-inch closed track, and a brush rake. The brush rake was made according to specifications furnished by the Division of Blister Rust Control.

The complete machine as seen in the accompanying picture shows the type of assembly that has proven best for this particular type of work, based on experience to date. The divided teeth with shaker bars have been replaced by solid members since the picture was taken.

The tractor was purchased by the Forest Service. A central control system was used for convenience in operation instead of the old side drive assembly.



W-1203. Tractor equipped with auxiliary motor, chain drive and assembly for operation of shaker bars.



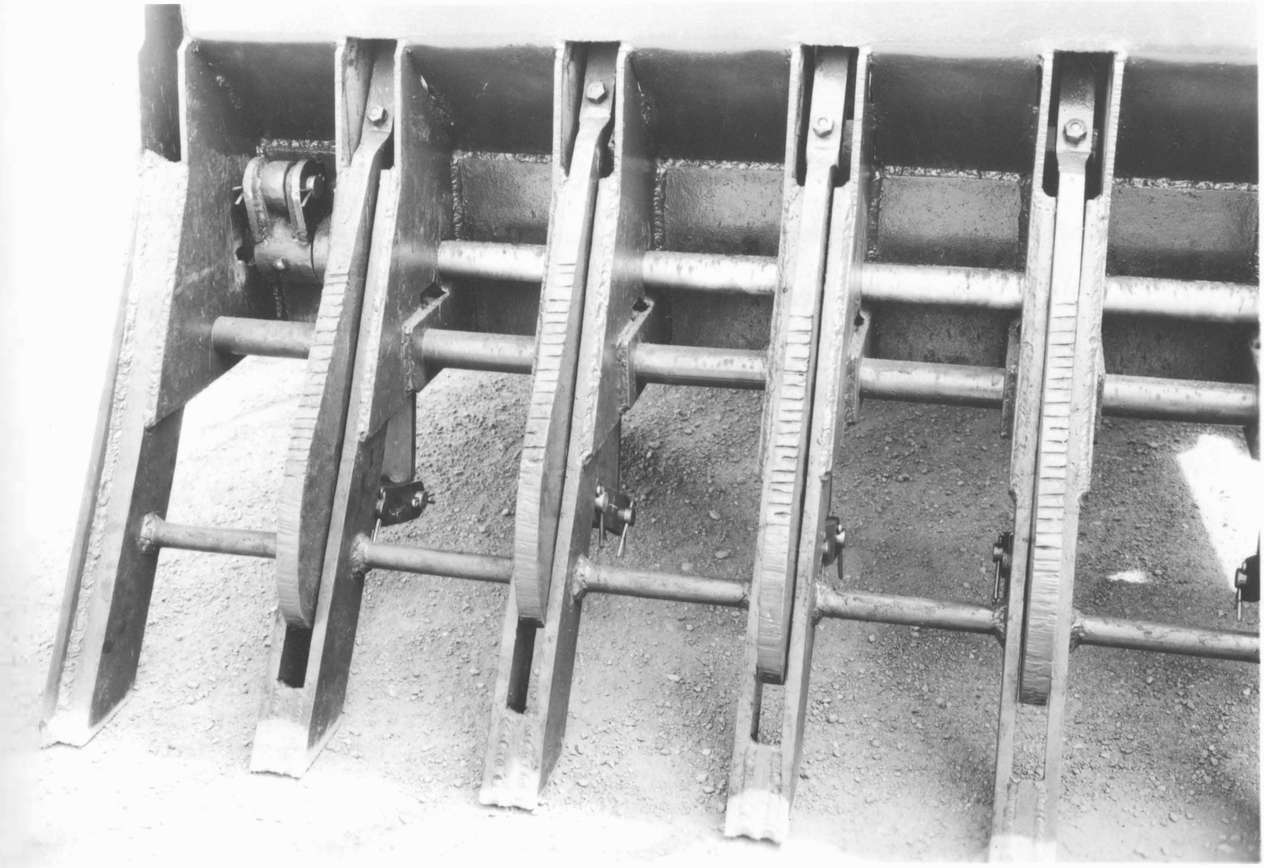
W-1207. Arrows indicate the eccentric bearings and their hangers. Note the pair of hardwood bearings supporting each eccentric.

Experiments with the 1932 machine had demonstrated that a closed frame containing digging teeth was not practical. As the wet earth hangs heavily to all brush roots, some means of eliminating a part of the wet, soggy soil was considered necessary. A new brush rake was constructed, using a divided tooth with a special shaking bar in the center of each tooth. The shaker bars were driven from an eccentric shaft. Each eccentric bar was supported on a spring; the two members being coupled at the base by a clevis, which allowed the piece to recede into the split tooth before the pressure became great enough to damage the eccentric bearings. The eccentric shaft was driven by a chain running from a gasoline engine which was mounted at the rear of the tractor. A gear box, gear shift and clutch were provided for power take-off and speed range. The object of this assembly was to shake the wet soil from the roots as they advanced up the front of the brush rake.

When field tests were made it was found that although the shaking assembly worked well at the beginning of the operation period, the divided teeth were not strong enough to support the heavy weight and force of the machine. They began breaking out and soon disabled the entire unit. Several supporting braces were put in and breaks were welded, but the assembly was not strong enough to support the power and weight of the tractor.

The brush rake was then rebuilt and solid heavy members were put on in place of the divided teeth. The shaking assembly was removed, as it was considered impossible to support the divided teeth which were a part of the shaking assembly. The frame was left open to allow the wet soil to fall away as much as possible from the roots of the plants.

To offset the loss of efficiency of the shaking unit, the correlation of the ground pilot and driver was stressed. This made it possible to just skim the surface, where conditions would permit.



W-1206. Front of machine showing shaker bar assembly. Note divided teeth.

W-1212. Front of rebuilt machine showing solid teeth. These teeth are of scarifer steel and each weighs 80 pounds.

Specifications:

Bulldozer assembly
Total weight..................23,000 pounds or 11-1/2 tons

Track width.......................18 inches
Weight per square inch on track......................7.8 pounds
Square inches track on ground.......................2,948
National Automobile Chamber of Commerce rating
horse power............................. .....38.96
Horse power per ton............ ....3.38
Ground clearance..................................11-¼ inches
Total clearing width..............................8 feet, 5-½ inches

Cost of machine as equipped for eradicating Ribes:

Caterpillar gasoline 50 tractor	$2,945.00
(exchange from Forest Service Engineering Dept.)	
Master bulldozer frame.................................	1,125.00
Special brush rake.....................................	1,804.80
Total..............................	$5,874.80

Eradicating, machine hours - total......................808

Moving, " " " 32
Total hours for season.................840

Fuel, gallons gasoline per hour...............................3.2
" Motor oil " " .... .125
" track and transmission oil per hour.............. .1
" hoist oil per hour............................ .04
pounds Alemite per hour.............................. .05

W-1211. Remodeled bulldozer brush rake as used in 1933.

W-1217. Slash disposal necessary in clearing some of the heavy Ribes areas.

METHOD OF WORKING THE AREAS

The ten men were organized into two crews, a machine crew and a slashing and powder crew. The four-man machine crew was divided into two units, consisting of a tractor driver and ground pilot in each case. The machine crew worked two shifts. The first crew worked from 4 a. m. to 7 a.m., and from 12 noon until 5.p.m. The second crew worked from 7 a.m. to 12 noon and from 5 p.m. until 8 p.m. The powder and slashing crew worked from 7 a.m. until 4 p.m.

Supervisors located the heavy Ribes areas in advance of the bulldozer crew. Maps with these heavy Ribes areas marked on them were furnished the bulldozer crew by the supervisors. The work was concentrated on the locations indicated on the maps.

Beaver dams and other obstacles were removed from the areas prior to working. This permitted the ground to dry sufficiently before the bulldozer got on it. If the ground dried out too slowly a crew was sent through to remove part of the heavy brush, which allowed the air to circulate near the ground.

From ten days to two weeks after the land had been drained the machine was put on the ground and the brush was removed and put into big piles. Each area was so worked by the machine that a cleared zone encircled each brush pile. This eliminated any possible spreadfrom ground fires when the brush was burned.

The ragged edges of the brush piles or windrows were gathered and laid over the openings by hand. This insured a more thorough and hot burn.

Because of the heavy brush cover, deep ditches and hazardous ground, a tractor guide or ground pilot was used. This man located the favorable sites for the brush piles with reference to standing timber, streams, and adjacent hillsides. He went over the ground immediately ahead of the machine, and advised the driver at all times as to brush pile locations, depth of digging assembly and hidden ditches or pitfalls which were all or in part hidden from view of the driver.

W-1208-10. A. Ribes area before clearing. B. Following clearing by machine. C. After brush piles were burned.

TABULATION OF BULLDOZER RESULTS ON ALL AREAS WORKED IN 1933

	Thiesen Creek		Honeysuckle Ranger Station		Coeur d'A. Riv., Burnt Cabin Creek		Horse Heaven Ranger Station		Magee R.S., Tepee Creek		Totals	
	Machine Hours	Man Days	Machine Hours	Man Days	Machine Hours	Man Days	Machine Hours	Man Days	Machine Hours	Man Days	Machine Hours	Man Days
July	160	158									160	158
August	53	46	128	120	43	42					224	208
Sept.					40	26	163	139			203	165
Oct.							36	25	185	122	221	147
Nov.										20	[illegible]	20
Totals	213	204	128	120	83	68	199	164	185	142	808	698
Acres	28.25	28.25	23.00	23.00	10.10	10.10	49.15	49.15	47.50	47.50	158	158
Per Acre	7.5	7.2	5.56	5.2	8.21	6.7	4.05	3.3	3.9	3.0	5.11	4.42
cost Per Acre	$65.67		$48.47		$71.57		$37.48		$33.96		$44.57	

The above per acre costs are based on a total expenditure of $6,033.51 plus $1,010.00 for depreciation of equipment, making a grand total of $7,043.51 for brush clearing by machine in 1933. The special figure for depreciation is based on 4,000 hours of continuous operation for the life of the machine. Depreciation is at $1.25 per hour and all repairs are charged as such.

The area worked at Burnt Cabin Creek was the most difficult encountered during the season. The costs per acre for the Horse Heaven Ranger Station district and the Tepee Creek country are examples of what may be expected under average conditions from a trained crew using a machine that is mechanically in good running order.

Costs of Clearing 158 Acres of Ribes inerme by Bulldozer Method

A.	Supervision	$722.40
B.	Wages	3,516.00
C.	Travel	45.61
D.	Transportation	125.00
E.	Equipment (depreciation at $1.25 per hour)	1,010.00
F.	Subsistence supplies	689.50
G.	Machine fuel supplies	575.00
	" repairs	360.00
	Total	$7,043.51

The average cost of $44.57 per acre is for clearing only. The cost of burning 51.25 acres of piled brush was $454.00 or $8.85 per acre. Add the cost of burning to the average cost of clearing and a per acre cost of clearing and burning of $53.42 is obtained.

CONCLUSION

The training period for men for this type of work requires at least two months' time to reach the highest point in efficiency, where totally inexperienced men are used, as was the case in 1933.

The speed of clearing by machine depends upon the degree of correlation of activities of the ground pilot and the machine driver. The ground pilot is the eyes of the machine in the heavy brush, and all hidden hazards must be known beforehand if progress is made by the machine.

All safeguards against fire must be cared for at the beginning of the clearing period, and all men engaged in clearing are made to adhere to regulations.

Land drainage at least ten days previous to clearing is very essential. Each area must be patrolled daily after initial drainage has taken place, because beavers are usually present and are a constant source of annoyance during the clearing period.

RECOMMENDATIONS FOR FUTURE WORK

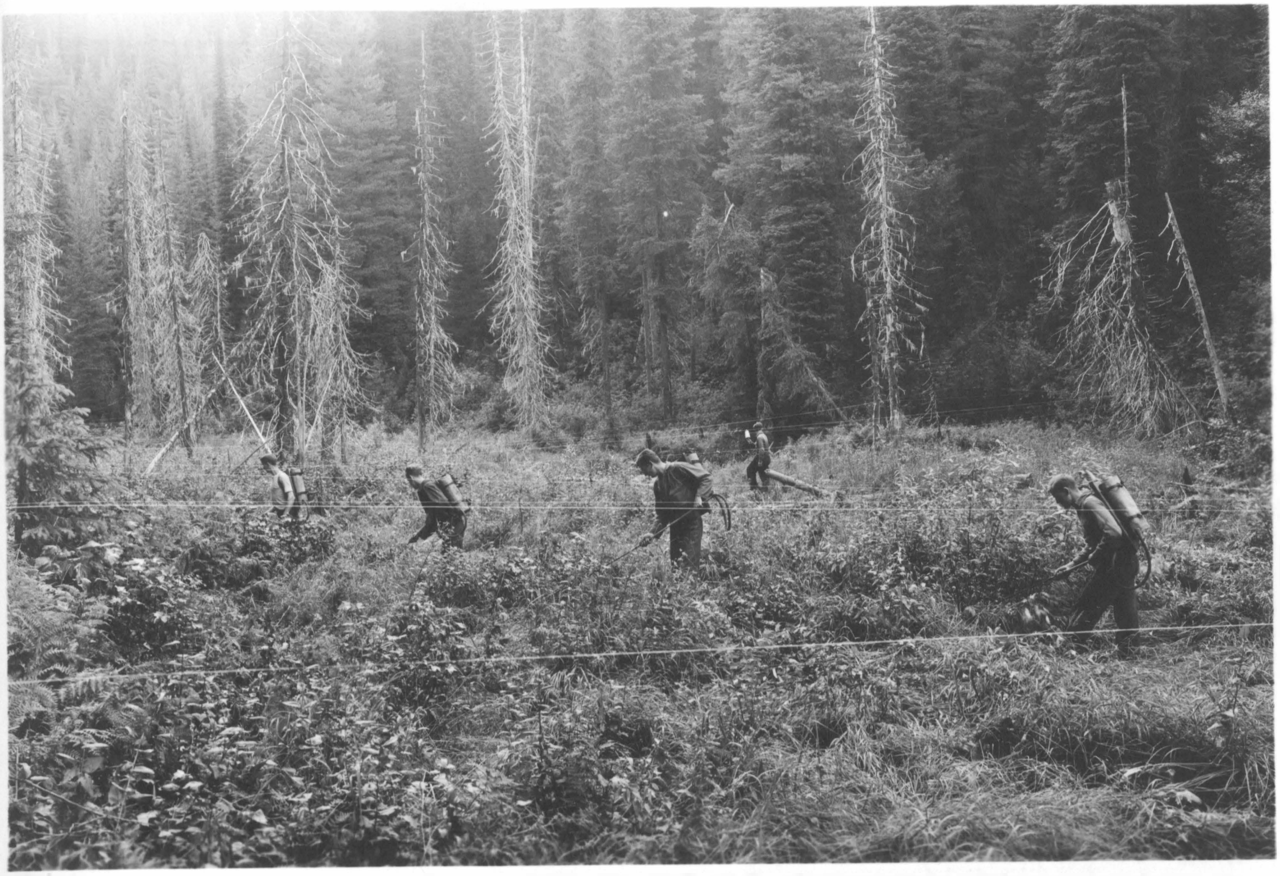
Continue the double shift for tractor operator and pilot. This allows the greatest possible daylight running time on a short working season. This also relieves the machine driver. The work is so fatiguing that there is a tendency to slow up when one man is required to drive without rest for long periods.

Use a powder man and two sawyers for advance and follow-up work.

In case additional machines are assembled, there should be a reduction in total gross weight if possible, and an increase in square inches of track on the ground. The distance between the digging teeth should be increased. The teeth at present are spaced at 10-3/4 inches, and by using one less tooth in the brush digging assembly on the same width frame, a spacing of 12-5/32 inches can be had. The earth will fall away more readily if the teeth are spaced at wider intervals. The lower crossbar should be placed two inches nearer the ends of the teeth to prevent small bushes and roots from slipping through.

Planting should be done in the cleared areas as soon as weather conditions permit after clearing. The planting should be done irrespective of the time of burning the brush piles.

In several instances the machine mired down and time was lost before brush clearing could be resumed. The total gross weight of the machine makes its progress slow over swampy ground, which in some instances retards the brush piling a great deal. A lighter tractor equipped with a wider track, and having greater horse power per ton, weight should be used in case additional units are put into service.



W-1168. Members of a CCC chemical crew working between their individual string lines applying chemical as a spray. The crew leader in the background is stripping the area to be worked.

W-1162. A 3-man CCC Ribes eradication crew on the Clearwater Timber Protective Association. Pine areas are systematically stripped and progress marked by the use of string.

RIBES ERADICATION CLEARWATER PROJECT
SEASON 1933

By

B. A. Anderson, Junior Forester, L. L. White, Agent
F. J. Heinrich, Agent, Division of Blister Rust Control
Paul H. Gerrard, Assistant Supervisor, Forest Service

INTRODUCTION

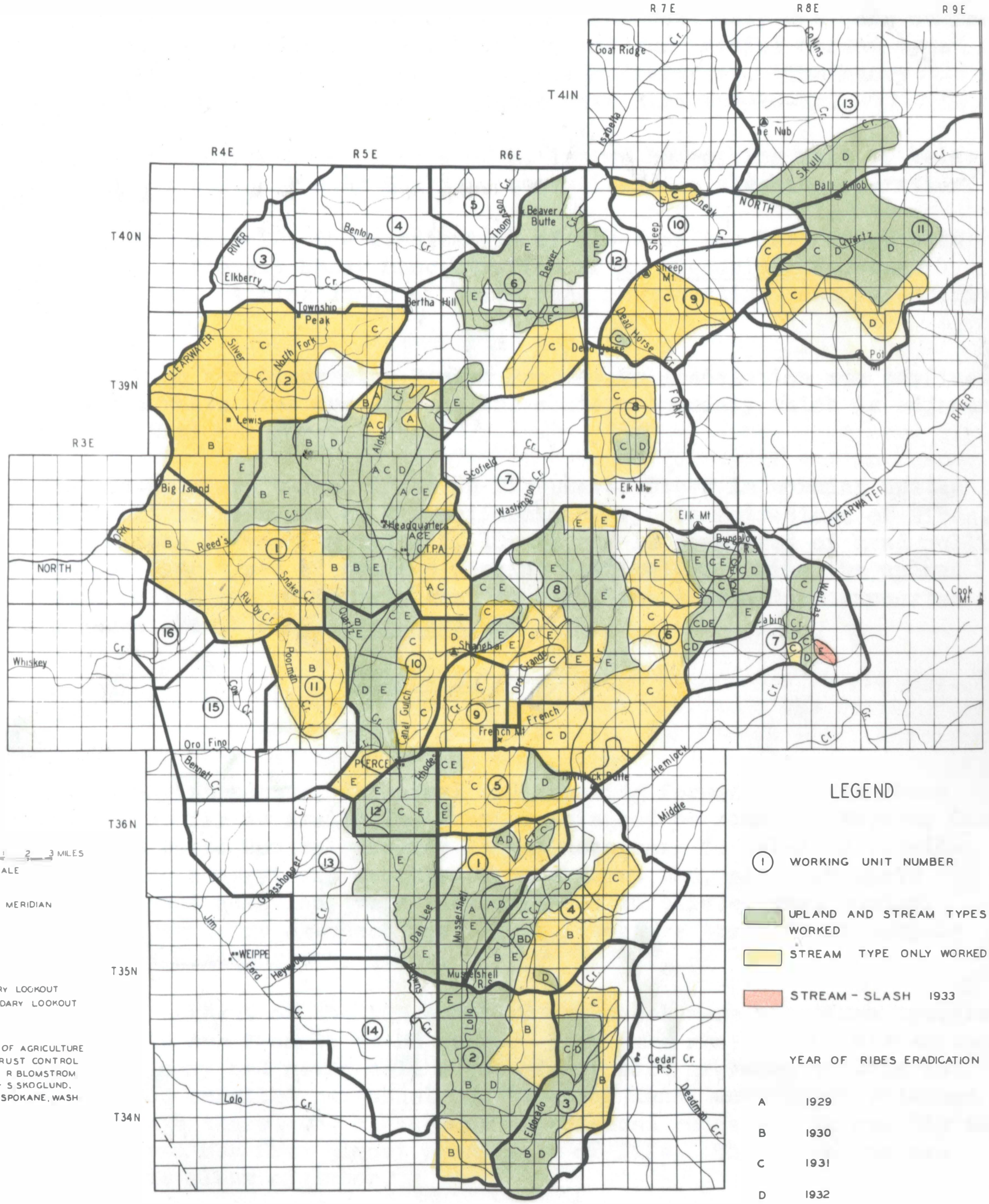
From 1929 through 1932 the blister rust control work on the white pine lands of the Clearwater Timber Protective Association and the Clearwater National Forest was carried on as two separate projects of the Division of Blister Rust Control. During the 1933 field season, however, these two projects were combined to form the Clearwater Project in order to facilitate the administration and supervision of the blister rust control activities of the ECW camps in the Lewiston District. Since the white pine areas of the National Forest and the Association are contiguous and form practically a solid body, the combination lends itself naturally to centralized supervision.

At the start of the 1932 field season the rust had such a general spread over the white pine belt in the Inland Empire, it was considered dangerous to delay any longer the eradication of Ribes from upland timber types. As a result complete eradication of both upland and stream type Ribes was done on all pine areas worked during the 1932 field season. This working policy was continued during the 1933 season.

On the Clearwater project fourteen 200-man ECW camps were engaged in rust control work during the entire field season and five 50-man NIRA camps were operated from August 25 to October 15. Some blister rust control work was done from a fifteenth ECW camp.

CLEARWATER PROJECT

BLISTER RUST CONTROL WORKING AREA



LOCATION AND DESCRIPTION OF AREAS

The work on the Clearwater National Forest was confined to forest working units 1, 2, 4, 5, 6, 7 and 12. In working units 1, 2, 4 and 5 initial upland and mop-up work on the streams was done. In working unit 6, on the area east of the Dee Dee Creek and north of the Orogrande, initial upland and mop-up work on the streams was finished; initial stream type work only was done on Dee Dee, Cottonwood and Shake Creeks; and initial upland and initial stream type work was done on Pine, Elk, Cache, and French Creek drainages. The heavy concentrations of Ribes inerme on the Orogrande were also mopped-up.

Extremely heavy concentrations of R. inerme in working unit 7, below Doris Creek near the Weitas Ranger Station, necessitated a slashing operation.

In working unit 12, the eradication of Ribes on the Hall Creek burn which supported an extremely heavy concentration of R. viscosissimum, was practically completed. A fine stand of white pine reproduction occurs on this area.

The work on the Clearwater Timber Protective Association was confined principally to the white pine areas along the eastern boundary which is adjacent to the Clearwater National Forest.

The cut-over and burned areas on Big Beaver Creek in working unit 6 were very difficult to work due to the uniformly heavy concentrations of Ribes. Most of the work done in working units 1, 10, 12 and 13 consisted of hand pulling on mature and cut-over types of average working difficulty. While the upland type in working unit 8 was relatively easy to work, the stream type supported an extremely dense growth of R. petiolare.

PERSONNEL

ECW Camps

Camp superintendents, technical and checking foremen, and checkers were selected, in so far as available, from experienced personnel. However due to the greatly increased control program it was necessary to select a considerable number of the supervisory overhead from a group who, although their foremanship was beyond question, were inexperienced in blister rust control technique. All supervisory overhead were given intensive training at schools held at Clarkia and Headquarters, Idaho.

About 90 percent of the ECW enrolled personnel were boys from upstate New York, varying in age from 18 to 25 years. They were absolutely inexperienced in woods work, and many had never held a job of any sort previous to this one. The remainder of the enrolled personnel consisted of local unemployed woodsmen, from Idaho. Although these were classed as experienced woodsmen, in reality they were local unemployed men from almost every walk of life. There were no age restrictions on this class of labor.

NIRA Camps

One camp superintendent and two technical foremen comprised the supervisory overhead for each fifty-man NIRA camp. A few of these supervisors were secured from ECW overhead and from outstanding men in the enrolled CCC's. Others were secured from the Coeur d'Alene National Forest operation.

The laborers in the NIRA camps were recruited through local Nation Reemployment Agencies. The majority of these men, although new to blister rust control, were accustomed to hard labor of various sorts and a considerable number of them had had experience in woods work. Their ages varied from 18 to 65 years.

ORGANIZATION AND ADMINISTRATION

The general organization of the ECW camps has been explained in the general report on Ribes Eradication in the Inland Empire. A Forest Service representative held the same responsibilities and duties as he did in the 1932 organization on the Clearwater National Forest. In addition, the Forest Service was responsible for all cooperative relations with the Army officials. A project supervisor of the Division of Blister Rust Control was responsible for the technical direction and supervision of the work in the field.

The ECW camps were divided into three units of four, five, and six camps to facilitate the supervision of the work. A unit supervisor was in charge of each of these units. The NIRA camps were added to these units when the NIRA program was approved.

One 50-man Forest Service NIRA camp was organized about September 1. All details in the administration of this camp were handled by the Forest Service and Division of Blister Rust Control representatives.

Although the five 50-man NIRA camps on the Clearwater Timber Protective Association were theoretically under the sole supervision of the Division of Blister Rust Control project supervisor, actually, the Forest Service representative aided in the administration of the work.

METHODS AND EQUIPMENT

ECW Camps

Heretofore at least 30 percent of the men in the Ribes eradication camps have been experienced in blister rust control work.

This year there were only 11 experienced men (the camp superintendent, five eradication foremen, and four checkers) in each ECW camp, which made it necessary to train the men in crew methods in 20 to 30 man groups. Special attention was given to individuals who showed aptitude, and as soon as they understood a crew leader's duties, they were each given a three or four man crew. This training was continued until all of the men were working in these regular crews. The eradication foreman then spent his time checking on the work of the crews.

Every ECW camp had a number of men who were obvious misfits in so far as Ribes eradication work was concerned. Wherever these men could be detailed on ncesssary work of a different nature without letting down on the work standards, it was done. Because of the limited supervision and disciplinary measures, constant and unceasing watchfulness was necessary to keep production from stagnating.

Chemical eradication seemed to hold an especial attraction for the ECW men. This interest was fostered and abetted by allowing only the more conscientious workers to work on chemical spraying crews. The men were scrupulously careful to handle the chemical exactly as instructed. In general, the spray crews consisted of from four to six men instead of the regular three to five-man crews.

A solution of 1.4 pounds Atlacide per gallon of water was used in all spraying operations.

NIRA Camps

No spray work was done in these camps because of the late date they were established. The work was organized and carried on in exactly the same way as during the 1932 field season.

STATEMENT OF EXPENDITURES

Tables Nos. 1 and 2 are statements concerning the disbursement of NIRA funds allotted to the Division of Blister Rust Control for Ribes eradication work on state and private lands on the Clearwater Timber Protective Association. Table No. 1 is a statement of gross expenditures, while Table No. 2 is a statement of the net cost of the operation after deducting for non-depreciated equipment, etc.

TABLE NO. 1

STATEMENT OF GROSS EXPENDITURES OF NIRA OPERATION ON STATE AND PRIVATE LANDS OF THE CLEARWATER PROJECT, (DIVISION OF BLISTER RUST CONTROL FUNDS) CALENDAR YEAR 1933

Item of Expenditure		Cost	
		Per Item	Total
Salaries and Wages	Permanent Men	$ 1,949.92	
	Temporary field men	23,617.23	$25,567.15
Subsistence	Wages, cooks and flunkies	2,490.40	
	Cost of food	6,921.94	
	Transportation of food	175.87	9,588.21
General Equipment	Cost	5,336.69	
	Repairs	14.91	
	Transportation	184.41	5,536.01
Miscellaneous	Supplies	8.72	
	Expenses	545.23	553.95
General Transportation	Trucks	4,871.69	
	Accessories and Repairs	150.29	
	Gas and Oil	133.42	5,155.40
	Grand Total	$46,400.72	$46,400.72

TABLE NO. 2

STATEMENT OF NET COST OF NIRA RIBES ERADICATION OPERATION ON
STATE AND PRIVATE LANDS OF THE CLEARWATER PROJECT
(DIVISION OF BLISTER RUST CONTROL FUNDS.) CALENDAR YEAR 1933

Item of Expenditure		Cost Per Item	Cost Total
Salaries and Wages	Permanent Men	$ 1,949.92	
	Temporary Field Men	23,248.23	$25,198.15
Subsistence	Wages, Cooks and Flunkies	2,490.40	
	Cost of Food	5,487.95	
	Transportation of Food	377.43	8,355.78
General Equipment	Cost	1,778.90	
	Repairs	14.91	
	Transportation	607.25	2,401.06
Miscellaneous	Supplies	8.72	
	Expenses	538.23	546.95
General Transportation	Trucks	188.86	
	Accessories and Repairs	30.06	
	Gas and Oil	26.68	245.60
Grand Total		$36,747.54	$36,747.54

Explanation of differences between gross costs (Table No. 1) and net costs (Table No. 2).

1. Salaries and Wages, temporary field men. Amount charged to preeradication on area to be worked in the future.........$ 369.00
2. Subsistence, cost of food. Deducted for preeradication Kaniksu National Forest.................................... 445.28
   Deducted for preeradication Clearwater Timber Protective Association.. 118.15
   Deducted cost of food left over and stored for 1934 use...... 870.56
   Total deductions $1,433.99
3. Subsistence, transportation of food.
   Transportation of food and general equipment charges are built up from the charges vouchered as transportation costs under gross expenditures plus a proportionate share of the items vouchered as accessories and repairs, gas and oil, and depreciation of trucks.
4. General Equipment, cost.
   Only one-third of the cost of equipment purchases was charged against the field season of 1933. Two-thirds of this item is held over to be charged against the 1934 and 1935 work.
5. Miscellaneous, expenses.
   Deduction for rental of sleeping quarters for men engaged upon the preeradication survey, Clearwater Timber Protective Association...$7.00
6. General Transportation, trucks.
   Truck costs are depreciated on the basis of an average life of 30,000 miles. Proportionate share of depreciation charged to transportation of food and equipment as explained above under 3. Balance shown in Table No. 2 is share of depreciation on trucks used for supervisory purposes.

7. Transportation, accessories and repairs, gas and oil. The bulk of these items was charged back to transportation of food and equipment and preeradication. The amount charged to preeradication was....................................$85.07

Statement of Composite Cost per Effective Man Day on NIRA Operation on State And Private Lands on Clearwater Project (Division of Blister Rust Control Funds).

Total cost of operation...... ....$36,747.54
Number of effective man days.............. 5,046
Cost per effective man day................ 7.28

Statement of Actual Expenditures According to Fiscal Year

Fiscal Year 1934, period of July 1, 1933 to December 31, 1933...............................$46,400.72

Statement of Meal Costs

Total net cost of subsistence..............$ 8,355.78
Number of meals served..................... 28,044
Average cost per meal served................ 0.298

Cost of Checking Work

Cost of checking work...................... $847.41
Cost per acre checked ($847.41 + 5,684...... 0.149

I. Expenditures by Appropriations of all ECW Work and Forest Service NIRA Work on Clearwater Project for the Calendar Year 1933.

Fiscal Year 1933 (last half)

A. Forest Service Blister Rust Appropriation S & E........ ....$ 4,645.48
B. ECW Blister Rust Control Appropriation. 9,778.10
Total..................................$14,423.58

Fiscal Year 1934 (first half)

A. Forest Service Blister Rust Control Appropriation S & E..................$ 168.16
B. NIRA Forest Service Appropriation...... 6,094.48
C. ECW Forest Service Appropriation....... 87,970.64
D. ECW Blister Rust Control Appropriation.................................. 5,565.93
Total.................................$99,799.21
Grand Total, both fiscal years............$114,222.79

II. Classified Expenditures of all ECW Work and Forest Service NIRA Work on Clearwater Project for Calendar Year 1933.

A. Salaries
   1. Forest Service, S&E........................$ 91.27
   2. ECW Blister Rust Control Appropriation...... 8,878.93
      a. Contributed Salaries
         (1) NIRA Forest Service Appropriation............................ 90.31
         (2) ECW Forest Service Appropriation............................ 1,533.85
                     Total Salaries..........................$10,594.36

B. Wages
   1. Forest Service, S & E......................$1,112.65
   2. NIRA Forest Service Appropriation........... 4,165.83
   3. ECW Forest Service Appropriation............57,199.99
   4. ECW Blister Rust Control Appropriation...... 470.26
                     Total Wages.........................$62,948.73

C. Travel and Transportation
   1. Forest Service, S & E......................$ 263.64
   2. NIRA Forest Service Appropriation........... 35.58
   3. ECW Forest Service Appropriation............ 8,911.86
   4. ECW Blister Rust Control Appropriation...... 1,301.32
      a. Contributed Transportation
         (1) Forest Service, S & E.............. 40.72
                     Total Transportation................$10,553.12

D. Subsistence Supplies
   1. Forest Service, S & E......................$1,289.40
   2. NIRA Forest Service Appropriation........... 1,621.58
   3. ECW Forest Service Appropriation............ 12.10
                     Total Subsistence...................$ 2,923.08

E. Supplies and Equipment
   1. Camp Equipment
      a. Forest Service, S & E..................$1,276.85
      b. NIRA Forest Service Appropriation..... 118.56
      c. ECW Forest Service Appropriation...... 649.95
      d. ECW Blister Rust Control Appropriation 670.42
      Total Camp Equipment..........................$2,715.78
   2. Eradication Equipment
      a. Forest Service, S & E..................$ 280.00
      b. NIRA Forest Service Appropriation..... 21.90
      c. ECW Forest Service Appropriation......18,763.73
      d. ECW Blister Rust Control Appropriation 4,019.77
      Total Eradication Equipment.................$23,085.40
                     Total Equipment.....................$25,801.18

Carried Forward..$112,820.47

Brought Forward..$112,820.47

F. Miscellaneous
   1. Forest Service, S & E...............$ 481.67
   2. ECW Forest Service Appropriation.... 899.16
   3. ECW Blister Rust Control Appropriation 3.33
   4. Contributed Miscellaneous
      a. Forest Service, S & E......... 18.16
         Total Miscellaneous.....................$ 1,402.32

Grand Total..............................$114,222.79

III. Activity Cost, All ECW Work on Clearwater Project, Calendar Year 1933.

A. Supervision
   1. Direct Project Supervision..........$ 8,742.59
   2. Temporary Project Supervision....... 39,412.24
   3. Checking
      a. Overhead Checking Supervision$1,252.07
      b. Wages.......................18,765.15
         Total Checking.............$20,017.22
   4. Overhead office.................... 426.80
   5. Overhead S.O.S..................... 247.08
   6. Preeradication..................... 192.46
   7. Travel Expense..................... 1,214.56
      Total Supervision.....................$ 70,252.95

B. Transportation
   1. Freight, Express and Drayage........$ 8,188.87
   2. Packing............................ 335.13
   3. Trucking........................... 1,504.14
      Total Transportation.................$ 10,028.14

C. Equipment
   1. Storage............................ 469.25
   2. Rental............................. 38.27
   3. Maintenance.......
      a. Camp Equipment..........$2,485.50
      b. Eradication Equipment...1,343.41
         Total Maintenance......... 3,828.91
   4. Depreciation
      a. Camp Equipment.......... 798.08
      b. Eradication Equipment... 1,371.59
      c. Other Equipment......... 188.86
         Total Depreciation.........2,358.53
   5. Eradication Supplies...............19,071.51
         Total Equipment........................$ 25,766.47

Carried Forward.. 106,047.56

Brought Forward			$106,047.56
D. Field Miscellaneous Expenses			
1. Camp Construction		$ 14.27	
Total Miscellaneous Expenses			14.27
E. Miscellaneous Expenses			902.69
Grand Total			$106.964.52

IV. Activity Costs, NIRA Forest Service, Calendar Year 1933.

A. Supervision			
1. Direct Project Supervision		$ 90.31	
2. Temporary Project Supervision		1,018.27	
3. Overhead Office		75.20	
4. Overhead S.O.S		20.00	
5. Travel Expense		23.45	
Total Supervision			$ 1,227.23
B. Transportation			
1. Freight, Express and Drayage		20.88	
2. Trucking		40.72	
Total Transportation			61.60
C. Equipment			
1. Storage		16.81	
2. Maintenance			
a. Camp Equipment	$217.34		
b. Eradication Equipment	50.00		
Total Maintenance		267.34	
3. Depreciation			
a. Camp Equipment	88.87		
b. Eradication Equipment	20.00		
Total Depreciation		108.67	
4. Eradication Supplies		18.25	
Total Equipment			411.04
D. Field Miscellaneous Expenses			
1. Camp Construction		$ 170.94	
Total Miscellaneous Expenses			170.94
E. Hand Pulling			2,153.93
F. Slashing and Burning			2,102.61
Grand Total			$ 6,127.38

Per Man Day Costs on Forest Service NIRA (Weitas).

Total Cost of Operation..........................$6,127.38
Number Effective Man Days......................996
Cost per Effective Man Day ($6,127.38/996)....... $6.15

SUMMARY OF RIBES ERADICATION WORK DONE

The results of Ribes eradication operations are presented in Tables Nos. 3 to 11 inclusive. In interpreting the data in these tables, the following points should be kept in mind:

1. The Clearwater Project includes the white pine blister rust control work in the Clearwater National Forest, and the Clearwater Timber Protective Association.

2. All Ribes eradication work done on the Clearwater Project is summarized in Table No. 3.

3. Initial and first mop-up Ribes eradication on the Clearwater Timber Protective Association are summarized according to ECW and NIRA work by Ribes eradication types in Table No. 4.

4. Initial and first mop-up Ribes eradication on the Clearwater National Forest are summarized according to ECW and NIRA work by Ribes eradication types in Table No. 5.

5. Initial and first mop-up Ribes eradication on the Clearwater Timber Protective Association are summarized by working units in Tables Nos. 6, 7 and 8.

6. Initial and first mop-up Ribes eradication on the Clearwater National Forest are summarized by working units in Tables Nos. 9, 10 and 11.

7. It was impossible to compute acreage and man day costs on ECW work because the Forest Service and Division of Blister Rust Control ECW expenditures represent principally supervisory costs. No figures are available covering salaries, wages, subsistence, transportation, medical care, etc. of the enrollees.

TABLE NO. 3

SUMMARY OF RIBES ERADICATION BY TYPES, ECW AND NIRA CAMPS
CLEARWATER PROJECT, 1933

Name	Eradication Type	Initial Eradication									First Mop-up									Total Eradication					
							Per Acre Basis									Per Acre Basis									
Name	Eradication Type	Acres	Effective Man Days	Total Ribes	Gallons Spray	Total Cost	Man Days	Ribes	Gallons Spray	Cost	Acres	Effective Man Days	Total Ribes	Gallons Spray	Total Cost	Man Days	Ribes	Gallons Spray	Cost	Acres Initial Eradication	Acres First Mop-up	Total Effective Man Days	Total Ribes	Gallons Spray	Total Cost
ECW Camps	Open reproduction	5.421	8.419	2.112.982			1.55	390												5.421		8.419	2.112.982		
	Dense reproduction	4.024	2.932	654.696			.73	163												4.024		2.932	654.696		
	Open pole	2.365	1.628	263.481			.69	111												2.365		1.628	263.481		
	Dense pole	201	92	22.716			.46	113												201		92	22.716		
	Open mature	44.998	20.431	4.931.044			.45	110			820	570	176.734			.70	216			44.998	820	21.001	5.107.778		
	Dense mature	2.892	369	110.872			.13	38												2.892		369	110.872		
	Selective cut-over	8.158	5.545	1.712.853			.68	210												8.158		5.545	1.712.853		
	Brush	575	536	103.482			.93	180												575		536	103.482		
	All upland	68.634	39.952	9.912.126			.58	144			820	570	176.734			.70	216			68.634	820	40.522	10.088.860		
	Stream (hand)	5.659	9.386	1.823.362			1.66	322			2.804	2.141	408.503			.76	146			5.659	2.804	11.527	2.231.865		
	Stream (chemical)	2.743	5.373		152.214		1.96		56		366	507		11.736		1.39		32		2.743	366	5.880		163.950	
	All stream	5.659	14.759	1.823.362			2.61	322			2.804	2.648	408.503			.94	146			5.659	2.804	17.407	2.231.865		
	All types	74.293	54.711	11.735.488			.74	158			3.624	3.218	585.237			.89	162			74.293	3.624	57.929	12.320.725		
NIRA Camps	Open reproduction	3.315	2.064	571.004		$14.619.60	.62	172		$ 4.41										3.315		2.064	571.004		$14.619.60
	Dense reproduction	51	18	242		131.09	.35	5		2.57										51		18	242		131.09
	Open pole	15	7	116		50.98	.47	8		3.40										15		7	116		50.98
	Open mature	1.059	815	184.953		5.935.25	.77	175		5.60										1.059		815	184.953		5.935.25
	Selective cut-over	1.249	1.503	1.150.779		10.945.61	1.20	921		8.76										1.249		1.503	1.150.779		10.945.61
	All upland	5.689	4.407	1.907.094		31.682.53	.77	335		5.57										5.689		4.407	1.907.094		31.682.53
	Stream (hand)	600	1.102	349.477		7.867.04	1.84	582		13.11	184	41	16.550		$298.58	.22	90		$1.62	600	184	143	366.027		8.165.62
	Stream (slash)	39	492	188.983		3.026.77	12.62	4.846		77.61										39		492	188.963		3.026.77
	All stream	639	1.594	538.460		10.893.81	2.49	843		17.05	184	41	16.550		298.58	.22	90		1.62	639	184	1.635	555.010		11.192.39
	All types	6.328	6.001	2.445.554		$42.576.34	.95	387		$ 6.73	184	41	16.550		$298.58	.22	90		$1.62	6.328	184	6.042	2.462.104		$42.874.92
ECW and NIRA Camps	Open reproduction	8.736	10.483	2.683.986			1.20	307												8.736		10.483	2.683.986		
	Dense reproduction	4.075	2.950	654.938			.72	161												4.075		2.950	654.938		
	Open pole	2.380	1.635	263.597			.69	111												2.380		1.635	263.597		
	Dense pole	201	92	22.716			.46	113												201		92	22.716		
	Open mature	46.057	21.246	5.115.997			.46	111			820	570	176.734			.69	216			46.057	820	21.816	5.292.731		
	Dense mature	2.892	369	110.872			.13	38												2.892		369	110.872		
	Selective cut-over	9.407	7.048	2.863.632			.75	304												9.407		7.048	2.863.632		
	Brush	575	536	103.482			.93	180												575		536	103.482		
	All upland	74.323	44.359	11.819.220			.60	159			820	570	176.734			.69	216			74.323	820	44.929	11.995.954		
	Stream (hand)	6.249	10.488	2.172.839			1.68	348			2.988	2.182	425.053			.73	142			6.249	2.988	12.670	2.597.892		
	Stream (chemical)	2.743	5.373		152.214		1.96		56		366	507		11.736		1.39		32		2.743	366	5.880		163.950	
	Stream (slash)	39	492	188.983			12.62	4.845												39		492	188.963		
	All stream	6.288	16.353	2.361.822			2.60	376			2.988	2.689	425.053			.90	142			6.288	2.988	19.042	2.786.875		
	All types	80.611	60.712	14.181.042			.75	176			3.808	3.259	601.787			.86	158			80.611	3.808	63.971	14.782.829		

Acres in stream type worked by both hand and chemical methods included only once in totals.

Annual Report 1933
B. A. Anderson

TABLE NO. 4

SUMMARY OF RIBES ERADICATION BY TYPES, ECW AND NIRA CAMPS
CLEARWATER TIMBER PROTECTIVE ASSOCIATION, 1933

Name	Eradication Type	Initial Eradication									First Mop-up									Total Eradication					
							Per Acre Basis									Per Acre Basis									
		Acres	Effective Man Days	Total Ribes	Gallons Spray	Total Cost	Man Days	Ribes	Gallons Spray	Cost	Acres	Effective Man Days	Total Ribes	Gallons Spray	Total Cost	Man Days	Ribes	Gallons Spray	Cost	Acres Initial Eradication	Acres First Mop-up	Effective Man Days	Total Ribes	Gallons Spray	Total Cost
ECW Camps	Open reproduction	3,165	6,582	1,668,056			2.08	527												3,165		6,582	1,668,056		
	Dense reproduction	1,334	1,275	201,323			.96	151												1,334		1,275	201,323		
	Open pole	1,330	839	128,724			.63	97												1,330		839	128,724		
	Dense pole	110	61	20,978			.55	191												110		61	20,978		
	Open mature	36,373	15,459	2,953,063			.43	81												36,373		15,459	2,953,063		
	Dense mature	2,277	336	108,924			.15	48												2,277		336	108,924		
	Selective cut-over	8,052	5,358	1,636,617			.67	203												8,052		5,358	1,636,617		
	Brush	575	536	103,482			.93	180												575		536	103,482		
	All upland	53,216	30,446	6,821,167			.57	128												53,216		30,446	6,821,167		
	Stream (hand)	4,162	6,638	1,354,937			1.59	326			2,200	1,669	305,238			.76	139			4,162	2,200	8,307	1,660,175		
	Stream (chemical)	2,269	4,529		129,802		2.00		57		222	295		7,172		1.33		32		2,269	222	4,824		136,974	
	All stream	4,162	11,167	1,354,937			2.68	326			2,200	1,964	305,238			.89	139			4,162	2,200	13,131	1,660,175		
	All types	57,378	41,613	8,176,104			.73	143			2,200	1,964	305,238			.89	139			57,378	2,200	43,577	8,841,342		
NIRA Camps	Open reproduction	3,204	1,700	520,876		$12,380.27	.53	163		$ 3.86										3,204		1,700	520,876		$12,380.27
	Dense reproduction	51	18	242		131.09	.35	5		2.57										51		18	242		131.09
	Open pole	15	7	116		50.98	.47	8		3.40										15		7	116		50.98
	Open mature	1,059	815	184,953		5,935.25	.77	175		5.60										1,059		815	184,953		5,935.25
	Selective cut-over	1,249	1,503	1,150,779		10,945.61	1.20	921		8.76										1,249		1,503	1,150,779		10,945.61
	All upland	5,578	4,043	1,856,966		29,443.25	.72	333		5.28										5,578		4,043	1,856,966		29,443.20
	Stream (hand)	106	261	35,857		1,900.73	2.46	338		17.93	184	41	16,550		$298.58	.22	90		$1.62	106	184	302	52,407		2,199.31
	All types	5,684	4,304	1,892,823		$31,343.93	.76	333		$ 5.51	184	41	16,550		$298.58	.22	90		$1.62	5,684	184	4,345	1,909,373		$31,642.51
ECW and NIRA Camps	Open reproduction	6,369	8,282	2,188,932			1.30	344												6,369		8,282	2,188,932		
	Dense reproduction	1,385	1,293	201,565			.93	146												1,385		1,293	201,565		
	Open pole	1,345	846	128,840			.63	96												1,345		846	128,840		
	Dense pole	110	61	20,978			.55	191												110		61	20,978		
	Open mature	37,432	16,274	3,138,016			.43	84												37,432		16,274	3,138,016		
	Dense mature	2,277	336	108,924			.15	48												2,277		336	108,924		
	Selective cut-over	9,301	6,861	2,787,396			.74	300												9,301		6,861	2,787,396		
	Brush	575	536	103,482			.93	180												575		536	103,482		
	All upland	58,794	34,489	8,678,133			.59	148												58,794		34,489	8,678,133		
	Stream (hand)	4,268	6,899	1,390,794			1.62	326			2,384	1,710	321,788			.72	135			4,268	2,384	8,609	1,712,582		
	Stream (chemical)	2,269	4,529		129,802		2.00		57		222	295		7,172		1.33		32		2,269	222	4,824		136,974	
	All stream	4,268	11,428	1,390,794			2.68	326			2,384	2,005	321,788			.84	135			4,268	2,384	13,433	1,712,582		
	All types	63,062	45,917	10,068,927			.73	160			2,384	2,005	321,788			.84	135			63,062	2,384	47,922	10,390,715		

Acres in stream type worked by both hand and chemical methods included only once in totals.

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TABLE NO. 5

SUMMARY OF RIBES ERADICATION BY TYPES ECW AND NIRA CAMPS
CLEARWATER NATIONAL FOREST, 1933

		Initial Eradication					Per Acre Basis				First Mop-up				Per Acre Basis			Total Eradication					
Name	Eradication Type	Acres	Effective Man Days	Total Ribes	Gallons Spray	Total Cost	Man Days	Ribes	Gallons Spray	Cost	Acres	Effective Man Days	Total Ribes	Gallons Spray	Man Days	Ribes	Gallons Spray	Acres Initial Eradication	Acres First Mop-up	Total Effective Man Days	Total Ribes	Gallons Spray	Total Cost
ECW Camps	Open reproduction	2,256	1,837	444,926			.81	197										2,256		1,837	444,926		
	Dense reproduction	2,690	1,657	453,373			.61	169										2,690		1,657	453,373		
	Open pole	1,035	789	134,757			.76	130										1,035		789	134,757		
	Dense pole	91	31	1,738			.34	19										91		31	1,738		
	Open mature	8,625	4,972	1,977,981			.57	229			820	570	176,734		.70	216		8,625	820	5,542	2,154,715		
	Dense mature	615	33	1,948			.05	3										615		33	1,948		
	Selective cut-over	106	187	76,236			.83	719										106		187	76,236		
	All upland	15,418	9,506	3,090,959			.62	200			820	570	176,734		.70	216		15,418	820	10,076	3,267,693		
	Stream (hand)	1,497	2,748	468,425			1.84	313			604	472	103,265		.78	171		1,497	604	3,220	571,690		
	Stream (chemical)	474	844		22,412		1.78		47		144	212		4,564	1.47		32	474	144	1,056		26,976	
	All stream	1,497	3,592	468,425			2.40	313			604	684	103,265		1.13	171		1,497	604	4,276	571,690		
	All types	16,915	13,098	3,559,384			.77	210			1,424	1,254	279,999		.88	197		16,915	1,424	14,352	3,839,383		
NIRA Camps	Open reproduction	111	364	50,128		$ 2,239.33	3.28	452		$20.17								111		364	50,128		$ 2,239.33
	Stream (hand)	494	841	313,620		5,966.31	1.70	635		12.08								494		841	313,620		5,966.31
	Stream (slash)	39	492	188,983		3,026.77	12.62	4,846		77.61								39		492	188,983		3,026.77
	All stream	533	1,333	502,603		8,993.08	2.50	943		16.87								533		1,333	502,603		8,993.08
	All types	644	1,697	552,731		$11,232.41	2.64	858		$17.44								644		1,697	552,731		$11,232.41
ECW and NIRA Camps	Open reproduction	2,367	2,201	495,054			.97	209										2,367		2,201	495,054		
	Dense reproduction	2,690	1,657	453,373			.61	169										2,690		1,657	453,373		
	Open pole	1,035	789	134,757			.76	130										1,035		789	134,757		
	Dense pole	91	31	1,738			.34	19										91		31	1,738		
	Open mature	8,625	4,972	1,977,981			.57	229			820	570	176,734		.70	216		8,625	820	5,542	2,154,715		
	Dense mature	615	33	1,948			.05	3										615		33	1,948		
	Selective cut-over	106	187	76,236			.83	719										106		187	76,236		
	All upland	15,529	9,870	3,141,087			.64	202			820	570	176,734		.70	216		15,529	820	10,440	3,317,821		
	Stream (hand)	1,981	3,589	782,045			1.81	393			604	472	103,265		.78	171		1,981	604	4,061	885,310		
	Stream (chemical)	474	844		22,412		1.78		47		144	212		4,564	1.47		32	474	144	1,056		26,976	
	Stream (slash)	39	492	188,983			12.62	4,846										39		492	188,983		
	All stream	*2,020	4,925	971,028			2.44	478			604	684	103,265		1.13	171		*2,020	604	5,609	1,074,293		
	All types	17,549	14,795	4,112,115			.84	234			1,424	1,254	279,999		.88	197		17,549	1,424	16,049	4,392,114		

*Includes 533 acres stream type in Working Units 6 and 7 where spraying was not completed.
Acres in stream type worked by both hand and chemical methods included only once in totals.

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TABLE NO. 6

SUMMARY OF RIBES ERADICATION BY WORKING UNITS
CLEARWATER TIMBER PROTECTIVE ASSOCIATION, 1933

Working Unit Number	Eradication Type	Acres Initial Eradication	Acres First Mop-up	Man Days	Number of Ribes Pulled: Ribes lacustre	Ribes viscosissimum	Ribes petiolare	Ribes inerme	Ribes irriguum	Total Ribes	Gallons Spray
1	Open reproduction	685		978	52,471	151,239	21	88		203,819	
	Open pole	110		73	9	43,306				43,315	
	Open mature	12,784		3,032	170,123	181,805	716	36,765		389,409	
	Dense mature	846		28	245	2,580				2,825	
	Selective cut-over	1,861		1,791	65,135	316,370				381,505	
	Brush	436		486	12,166	73,490	16,299			101,955	
	All upland	16,722		6,388	300,149	768,790	17,036	36,853		1,122,828	
	Stream (hand)		1,519	1,306	89,144	61,068	86,920	4,580		241,712	
	Stream (chemical)		29	54							717
	All stream		1,519	1,360	89,144	61,068	86,920	4,580		241,712	
	All types	16,722		7,748	389,293	829,858	103,956	41,433		1,364,540	
2	Selective cut-over	1,079		857	23,246	421,202	316	5,728		450,492	
	Brush	139		50	22	1,505				1,527	
	All upland	1,218		907	23,268	422,707	316	5,728		452,019	
	Stream (hand)	60	18	50	605	3,561	217	276		4,659	
	All types	1,278		957	23,873	426,268	533	6,004		456,678	
6	Open reproduction	1,342		3,527	173,666	342,162				515,828	
	Dense reproduction	112		548	1,659	129,791	16			131,466	
	Open mature	6,902		5,095	922,751	271,500	794	6,803		1,201,848	
	Dense mature	27									
	Selective cut-over	3,569		1,789	142,465	482,251				624,716	
	All upland	11,952		10,959	1,240,541	1,225,704	810	6,803		2,473,858	
	Stream (hand)	1,553	24	3,308	668,818	28,397	28,173	1,981		727,369	
	Stream (chemical)	388		1,177							27,401
	All stream	1,553	24	4,485	668,818	28,397	28,173	1,981		727,369	
	All types	13,505		15,444	1,909,359	1,254,101	28,983	8,784		3,201,227	
8	Open reproduction	180		342	100,468	19,064	46			119,578	
	Dense reproduction	38		53	5,635	885				6,520	
	Open pole	394		110	36,846	48				36,894	
	Open mature	5,812		4,146	1,266,498	22,546	534			1,289,578	
	Dense mature	950		189	85,696	12				85,708	
	All upland	7,374		4,840	1,495,143	42,555	580			1,538,278	
	Stream (hand)	1,500	199	2,344	537,163	539	20,076			557,778	
	Stream (chemical)	1,520	125	2,671							87,485
	All stream	1,500	199	5,015	537,163	539	20,076			557,778	
	All types	8,874		9,855	2,032,306	43,094	20,656			2,096,056	
10	Open reproduction	3,902		3,149	61,300	1,206,942				1,268,242	
	Dense reproduction	51		18	71	171				242	
	Open pole	195		101	427	5,886				6,313	
	Dense pole	79		37	3,010	17,251				20,261	
	Open mature	879		260	11,243	3,406				14,649	
	Dense mature	386		103	3,017	16,796				19,813	
	Selective cut-over	2,717		2,340	127,598	1,141,910	22,609	407		1,292,524	
	All upland	8,209		6,008	206,666	2,392,362	22,609	407		2,622,044	
	Stream (hand)		514	120	6,694	14,513	12,409			33,616	
	Stream (chemical)		1	13							120
	All stream		514	133	6,694	14,513	12,409			33,616	
	All types	8,209		6,141	213,360	2,406,875	35,018	407		2,655,660	
12	Open reproduction	227		138	4,422	4,976				9,398	
	Open pole	593		553	16,809	23,580				40,389	
	Dense pole	31		24	627	90				717	
	Open mature	3,445		1,827	60,869	105,617				166,486	
	Dense mature	68		16	445	133				578	
	Selective cut-over	75		84	10,679	27,480				38,159	
	All upland	4,439		2,641	93,851	161,876				255,727	
	Stream (hand)	383	110	516	35,736	2,662	14,264			52,662	
	Stream (chemical)	118	67	155							3,408
	All stream	383	110	671	35,736	2,662	14,264			52,662	
	All types	4,822		3,312	129,587	164,538				308,389	
13	Open reproduction	33		148	56	72,011				72,067	
	Dense reproduction	1,184		674	4,834	50,855	13		7,635	63,337	
	Open pole	53		10	1,926	3				1,929	
	Open mature	7,610		1,914	55,581	2,175	2,163		16,127	76,046	
	All upland	8,880		2,746	62,397	125,044	2,176		23,762	213,379	
	Stream (hand)	772		965	70,701	8	2,010		22,067	94,786	
	Stream (chemical)	243		754							17,843
	All stream	772		1,719	70,701	8	2,010		22,067	94,786	
	All types	9,652		4,465	133,098	125,052	4,186		45,829	308,165	
All Units	Open reproduction	6,369		8,282	392,383	1,796,394	67	88		2,188,932	
	Dense reproduction	1,385		1,293	12,199	181,702	29		7,635	201,565	
	Open pole	1,345		846	56,017	72,823				128,840	
	Dense pole	110		61	3,637	17,341				20,978	
	Open mature	37,432		16,274	2,487,065	587,049	4,207	43,568	16,127	3,138,016	
	Dense mature	2,277		336	89,403	19,521				108,924	
	Selective cut-over	9,301		6,861	369,123	2,389,213	22,925	6,135		2,787,396	
	Brush	575		536	12,188	74,995	16,299			103,482	
	All upland	58,794		34,489	3,422,015	5,139,038	43,527	49,791	23,762	8,678,133	
	Stream (hand)	4,268	2,384	8,609	1,408,861	110,748	164,069	6,837	22,067	1,712,582	
	Stream (chemical)	2,269	222	4,824							136,974
	All stream	4,268	2,384	13,433	1,408,861	110,748	164,069	6,837	22,067	1,712,582	
	All types	63,062		47,922	4,830,976	5,249,786	207,596	56,628	45,829	10,390,715	

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Acres in stream type worked by both hand and chemical methods included only once in totals.

TABLE NO. 7

INITIAL RIBES ERADICATION BY WORKING UNITS
CLEARWATER TIMBER PROTECTIVE ASSOCIATION, 1933

Working Unit Number	Eradication Type	Acres	Man Days	Number of Ribes Pulled						Gallons Spray	Per Acre Basis		
				Ribes lacustre	Ribes viscosissimum	Ribes petiolare	Ribes inerme	Ribes irriguum	Total Ribes		Man Days	Ribes	Gallons Spray
1	Open reproduction	685	978	52,471	151,239	21	88		203,819		1.43	298	
	Open pole	110	73	9	43,306				43,315		.66	394	
	Open mature	12,784	3,032	170,123	181,805	716	36,765		389,409		.24	31	
	Dense mature	846	28	245	2,580				2,825		.03	3	
	Selective cut-over	1,861	1,791	65,135	316,370				381,505		.96	205	
	Brush	436	486	12,166	73,490	16,299			101,955		1.11	234	
	All upland	16,722	6,388	300,149	768,790	17,036	36,853		1,122,828		.38	67	
2	Selective cut-over	1,079	857	23,246	421,202	316	5,728		450,492		.79	418	
	Brush	139	50	22	1,505				1,527		.36	11	
	All upland	1,218	907	23,268	422,707	316	5,728		452,019		.74	371	
	Stream (hand)	60	33		3,249				3,249		.55	54	
	All types	1,278	940	23,268	425,956	316	5,728		455,268		.74	356	
6	Open reproduction	1,342	3,527	173,666	342,162				515,828		2.63	384	
	Dense reproduction	112	548	1,659	129,791	16			131,466		4.89	1,173	
	Open mature	6,902	5,095	922,751	271,500	794	6,803		1,201,848		.74	174	
	Dense mature	27											
	Selective cut-over	3,569	1,789	142,465	482,251				624,716		.50	175	
	All upland	11,952	10,959	1,240,541	1,225,704	810	6,803		2,473,858		.92	207	
	Stream (hand)	1,553	3,293	667,439	28,397	23,303	1,981		721,120		2.12	464	
	Stream (chemical)	388	1,177							27,401	3.03		71
	All stream	1,553	4,470	667,439	28,397	23,303	1,981		721,120		2.88	464	
	All types	13,505	15,429	1,907,980	1,254,101	24,113	8,784		3,194,978		1.14	237	
8	Open reproduction	180	342	100,468	19,064	46			119,578		1.90	664	
	Dense reproduction	38	53	5,635	885				6,520		1.39	172	
	Open pole	394	110	36,846	48				36,894		.28	94	
	Open mature	5,812	4,146	1,266,498	22,546	534			1,289,578		.71	222	
	Dense mature	950	189	85,696	12				85,708		.20	90	
	All upland	7,374	4,840	1,495,143	42,555	580			1,538,278		.66	209	
	Stream (hand)	1,500	2,225	517,098	345	13,784			531,227		1.48	354	
	Stream (chemical)	1,520	2,507							86,985	1.65		57
	All stream	1,500	4,732	517,098	345	13,784			531,227		3.15	354	
	All types	8,874	9,572	2,012,241	42,900	14,364			2,069,505		1.08	233	
10	Open reproduction	3,902	3,149	61,300	1,206,942				1,268,242		.81	325	
	Dense reproduction	51	18	71	171				242		.35	5	
	Open pole	195	101	427	5,886				6,313		.52	32	
	Dense pole	79	37	3,010	17,251				20,261		.47	257	
	Open mature	879	260	11,243	3,406				14,649		.30	17	
	Dense mature	386	103	3,017	16,796				19,813		.27	51	
	Selective cut-over	2,717	2,340	127,598	1,141,910	22,609	407		1,292,524		.86	476	
	All upland	8,209	6,008	206,666	2,392,362	22,609	407		2,622,044		.73	319	
12	Open reproduction	227	138	4,422	4,976				9,398		.61	41	
	Open pole	593	552	16,809	23,580				40,389		.93	68	
	Dense pole	31	24	627	90				717		.77	23	
	Open mature	3,445	1,827	60,869	105,617				166,486		.53	48	
	Dense mature	68	16	445	133				578		.24	9	
	Selective cut-over	75	84	10,679	27,480				38,159		1.12	509	
	All upland	4,439	2,641	93,851	161,876				255,727		.59	58	
	Stream (hand)	383	383	27,356	2,532	10,524			40,412		1.00	106	
	Stream (chemical)	118	91							2,073	.77		18
	All stream	383	474	27,356	2,532	10,524			40,412		1.24	106	
	All types	4,822	3,115	121,207	164,408	10,524			296,139		.65	61	
13	Open reproduction	33	148	56	72,011				72,067		4.48	2,184	
	Dense reproduction	1,184	674	4,834	50,855	13		7,635	63,337		.57	54	
	Open pole	53	10	1,926	3				1,929		.19	36	
	Open mature	7,610	1,914	55,581	2,175	2,163		16,127	76,046		.25	10	
	All upland	8,880	2,746	62,397	125,044	2,176		23,762	213,379		.31	24	
	Stream (hand)	772	965	70,701	8	2,010		22,067	94,786		1.25	123	
	Stream (chemical)	243	754							17,843	3.10		73
	All stream	772	1,719	70,701	8	2,010		22,067	94,786		2.23	123	
	All types	9,652	4,465	133,098	125,052	4,186		45,829	308,165		.46	32	
All Units	Open reproduction	6,369	8,282	392,383	1,796,394	67	88		2,188,932		1.30	344	
	Dense reproduction	1,385	1,293	12,199	181,702	29		7,635	201,565		.93	146	
	Open pole	1,345	846	56,017	72,823				128,840		.63	96	
	Dense pole	110	61	3,637	17,341				20,978		.55	191	
	Open mature	37,432	16,274	2,487,065	587,049	4,207	43,568	16,127	3,138,016		.43	84	
	Dense mature	2,277	336	89,403	19,521				108,924		.15	48	
	Selective cut-over	9,301	6,861	369,123	2,389,213	22,925	6,135		2,787,396		.74	300	
	Brush	575	536	12,188	74,995	16,299			103,482		.93	180	
	All upland	58,794	34,489	3,422,015	5,139,038	43,527	49,791	23,762	8,678,133		.59	148	
	Stream (hand)	4,268	6,899	1,282,594	34,531	49,621	1,981	22,067	1,390,794		1.62	326	
	Stream (chemical)	2,269	4,529							134,302	2.00		59
	All stream	4,268	11,428	1,282,594	34,531	49,621	1,981	22,067	1,390,794		2.68	326	
	All types	63,062	45,917	4,704,609	5,173,569	93,148	51,772	45,829	10,068,927		.73	160	

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Acres in stream type worked by both hand and chemical methods included only once in totals.

TABLE NO. 8

FIRST MOP-UP RIBES ERADICATION BY WORKING UNITS CLEARWATER TIMBER PROTECTIVE ASSOCIATION, 1933

Working Unit Number	Eradication Type	Acres	Effective Man Days	Number of Ribes Pulled					Gallons Spray	Per Acre Basis		
				Ribes lacustre	Ribes viscosissimum	Ribes petiolare	Ribes inerme	Total Ribes		Man Days	Ribes	Gals. Spray
1	Stream (hand)	1,519	1,306	89,144	61,068	86,920	4,580	241,712		.86	159	
	Stream (chemical)	29	54						717	1.86		25
	All Stream	1,519	1,360	89,144	61,068	86,920	4,580	241,712		.90	159	
2	Stream (hand)	18	17	605	312	217	276	1,410		.94	78	
6	Stream (hand)	24	15	1,379		4,870		6,249		.63	260	
8	Stream (hand)	199	119	20,065	194	6,292		26,551		.60	133	
	Stream (chemical)	125	164						500	1.31		4
	All stream	199	283	20,065	194	6,292		26,551		1.42	133	
10	Stream (hand)	514	120	6,694	14,513	12,409		33,616		.23	65	
	Stream (chemical)	1	13						120	13.00		120
	All stream	514	133	6,694	14,513	12,409		33,616		.26	65	
12	Stream (hand)	110	133	8,380	130	3,740		12,250		1.21	111	
	Stream (chemical)	67	64						1,335	.96		20
	All stream	110	197	8,380	130	3,740		12,250		1.79	111	
All Units	Stream (hand)	2,384	1,710	126,267	76,217	114,448	4,856	321,788		.72	135	
	Stream (chemical)	222	295						2,672	1.33		12
	All stream	2,384	2,005	126,267	76,217	114,448	4,856	321,788		.84	135	

Acres in stream type worked by both hand and chemical methods only once in totals.

TABLE NO. 9

SUMMARY OF RIBES ERADICATION BY WORKING UNITS
CLEARWATER NATIONAL FOREST, 1933

Working Unit Number	Eradication Type	Acres Initial Eradication	Acres First Mop-up	Man Days	Number of Ribes Pulled: Ribes lacustre	Ribes viscosissimum	Ribes petiolare	Ribes inerme	Total Ribes	Gallons Spray
1	Open reproduction	531		528	24,690	123,298			147,988	
	Dense reproduction	2,091		444	6,503	834			7,337	
	Open mature	2,685		919	53,045	8,302	5,127		66,474	
	Dense mature	135								
	All upland	5,442		1,891	84,238	132,434	5,127		221,799	
	Stream (hand)	91	507	366	62,221	4,468	20,595		87,284	
	Stream (chemical)		131	188						3,994
	All stream	91	507	554	62,221	4,468	20,595		87,284	
	All types	5,533	507	2,445	146,459	136,902	25,722		309,083	
2	Dense reproduction	48		15	254				254	
	Open mature	211		215	18,553	93	831		19,477	
	All upland	259		230	18,807	93	831		19,731	
	Stream (hand)		33	49	14,075				14,075	
	Stream (chemical)		4	7						185
	All stream		33	56	14,075				14,075	
	All types	259	33	286	32,882	93	831		33,806	
4	Open reproduction	1,116		712	14,806	134,158			148,964	
	Open mature	665		435	2,587	33,361			35,948	
	All upland	1,781		1,147	17,393	167,519			184,912	
	Stream (hand)	173	27	141	10,682	419	2,788		13,889	
	Stream (chemical)		9	17						385
	All stream	173	27	158	10,682	419	2,788		13,889	
	All types	1,954	27	1,305	28,075	167,938	2,788		198,801	
5	Open reproduction	272		231	5,519	34,722			40,241	
	Open pole	312		227	7,091	34,543			41,634	
	Dense pole	44		31	858	880			1,738	
	Open mature	368		315	8,729	88,150			96,879	
	Selective cut-over	106		187	19,246	56,990			76,236	
	All upland	1,102		991	41,443	215,285			256,728	
	Stream (hand)	108	12	105	8,280	133	4,979		13,392	
	All types	1,210	12	1,096	49,723	215,418	4,979		270,120	
6	Open reproduction	337		366	69,107	38,626			107,733	
	Dense reproduction	191		66	647	382			1,029	
	Open pole	723		562	62,234	30,889			93,123	
	Dense pole	47								
	Open mature	4,696	820	3,658	1,550,191	385,746			1,935,937	
	Dense mature	480		33	1,718	230			1,948	
	All upland	6,474	820	4,685	1,683,897	455,873			2,139,770	
	Stream (hand)	1,428	25	3,045	672,644	2,589	4,065	3,795	683,093	
	Stream (chemical)	473		842						22,367
	All stream	1,428	25	3,887	672,644	2,589	4,065	3,795	683,093	
	All types	7,902	845	8,572	2,356,541	458,462	4,065	3,795	2,822,863	
7	Open reproduction	111		364	39	32,318	983	16,788	50,128	
	Stream (hand)	80		140	889	1,977	5,396	36,866	45,128	
	Stream (slash)	39		492	36			188,947	188,983	
	All stream	119		632	925	1,977	5,396	225,813	234,111	
	All types	230		996	964	34,295	6,379	242,601	284,239	
12	Dense reproduction	360		1,132	15,258	429,495			444,753	
	Stream (hand)	101		215	24,080	1,059	514	2,796	28,449	
	Stream (chemical)	1		2						45
	All stream	101		217	24,080	1,059	514	2,796	28,449	
	All types	461		1,349	39,338	430,554	514	2,796	473,202	
All Units	Open reproduction	2,367		2,201	114,161	363,122	983	16,788	495,054	
	Dense reproduction	2,690		1,657	22,662	430,711			453,373	
	Open pole	1,035		789	69,325	65,432			134,757	
	Dense pole	91		31	858	880			1,738	
	Open mature	8,625	820	5,542	1,633,105	515,652	5,958		2,154,715	
	Dense mature	615		33	1,718	230			1,948	
	Selective cut-over	106		187	19,246	56,990			76,236	
	All upland	15,529	820	10,440	1,861,075	1,433,017	6,941	16,788	3,317,821	
	Stream (hand)	1,381	604	4,061	792,871	10,645	38,337	43,457	885,310	
	Stream (chemical)	474	144	1,056						26,976
	Stream (slash)	39		492	36			188,947	188,983	
	All stream	2,020*	604	5,609	792,907	10,645	38,337	232,404	1,074,293	
	All types	17,549	1,424	16,049	2,653,982	1,443,662	45,278	249,192	4,392,114	

*These figures include 533 acres stream type, in working units 6 and 7, where spraying was not completed.
Acres in stream type worked by both hand and chemical methods included only once in totals.
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TABLE NO. 10

INITIAL RIBES ERADICATION BY WORKING UNITS
CLEARWATER NATIONAL FOREST, 1933

Working Unit Number	Eradication Type	Acres	Man Days	Number of Ribes Pulled					Gallons Spray	Per Acre Basis		
				Ribes lacustre	Ribes viscosissimum	Ribes petiolare	Ribes inerme	Total Ribes		Man Days	Ribes	Gallons Spray
	Open reproduction	531	528	24,690	123,298			147,988		.99	279	
	Dense reproduction	2,091	444	6,503	834			7,337		.21	4	
	Open mature	2,685	919	53,045	8,302	5,127		66,474		.34	25	
1	Dense mature	135										
	All upland	5,442	1,891	84,238	132,434	5,127		221,799		.35	41	
	Stream (hand)	91	56	4,129		4,869		8,998		.62	99	
	All types	5,533	1,947	88,367	132,434	9,996		230,797		.36	42	
	Dense reproduction	48	15	254				254		.31	5	
2	Open mature	211	215	18,553	93	831		19,477		1.02	92	
	All upland	259	230	18,807	93	831		19,731		.89	76	
	Open reproduction	1,116	712	14,806	134,158			148,964		.64	134	
	Open mature	665	435	2,587	33,361			35,948		.65	54	
4	All upland	1,781	1,147	17,393	167,519			184,912		.64	104	
	Stream (hand)	173	111	9,000	325	1,664		10,989		.64	64	
	All types	1,954	1,258	26,393	167,844	1,664		195,901		.64	100	
	Open reproduction	272	231	5,519	34,722			40,241		.85	148	
	Open pole	312	227	7,091	34,543			41,634		.73	133	
	Dense pole	44	31	858	880			1,738		.70	40	
	Open mature	368	315	8,729	88,150			96,879		.86	263	
5	Selective cut-over	106	187	19,246	56,990			76,236		1.76	719	
	All upland	1,102	991	41,443	215,285			256,728		.90	233	
	Stream (hand)	108	95	7,442	120	3,305		10,867		.88	101	
	All types	1,210	1,086	48,885	215,405	3,305		267,595		.90	221	
	Open reproduction	337	366	69,107	38,626			107,733		1.09	320	
	Dense reproduction	191	66	647	382			1,029		.35	5	
	Open pole	723	562	62,234	30,889			93,123		.78	129	
	Dense pole	47										
	Open mature	4,696	3,088	1,521,629	237,574			1,759,203		.66	375	
6	Dense mature	480	33	1,718	230			1,948		.07	4	
	All upland	6,474	4,115	1,655,335	307,701			1,963,036		.64	303	
	Stream (hand)	1,428	2,972	667,213	2,541	4,065	3,795	677,614		2.08	475	
	Stream (chemical)	473	842						22,367	1.78		47
	All stream	1,428	3,814	667,213	2,541	4,065	3,795	677,614		2.67	475	
	All types	7,902	7,929	2,322,548	310,242	4,065	3,795	2,640,650		1.00	334	
	Open reproduction	111	364	39	32,318	983	16,788	50,128		3.28	452	
	Stream (hand)	80	140	889	1,977	5,396	36,866	45,128		1.75	564	
7	Stream (slash)	39	492	36			188,947	188,983		12.62	4,846	
	All stream	119	632	925	1,977	5,396	225,813	234,111		5.31	1,967	
	All types	230	996	964	34,295	6,379	242,601	284,239		4.33	1,236	
	Dense reproduction	360	1,132	15,258	429,495			444,753		3.14	1,235	
	Stream (hand)	101	215	24,080	1,059	514	2,796	28,449		2.13	282	
12	Stream (chemical)	1	2						45	2.00		45
	All stream	101	217	24,080	1,059	514	2,796	28,449		2.15	282	
	All types	461	1,349	39,338	430,554	514	2,796	473,202		2.93	1,027	
	Open reproduction	2,367	2,201	114,161	363,122	983	16,788	495,054		.93	209	
	Dense reproduction	2,690	1,657	22,662	430,711			453,373		.63	169	
	Open pole	1,035	789	69,325	65,432			134,757		.76	130	
	Dense pole	91	31	858	880			1,738		.34	19	
	Open mature	8,625	4,972	1,604,543	367,480	5,958		1,977,981		.58	229	
All	Dense mature	615	33	1,718	230			1,948		.05	3	
Units	Selective cut-over	106	187	19,246	56,990			76,236		1.76	719	
	All upland	15,529	9,870	1,832,513	1,284,845	6,941	16,788	3,141,087		.64	202	
	Stream (hand)	1,981	3,589	712,753	6,022	19,813	43,457	782,045		1.81	395	
	Stream (chemical)	474	844						22,412	1.78		47
	Stream (slash)	39	492	36			188,947	188,983		12.62	4,846	
	All stream	2,020	4,925	712,789	6,022	19,813	232,404	971,028		2.44	481	
	All types	17,549	14,795	2,545,302	1,290,867	26,754	249,192	4,112,115		.84	234	

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Acres in stream type worked by both hand and chemical methods included only once in totals.

TABLE NO. 11

FIRST MOP-UP RIBES ERADICATION BY WORKING UNITS
CLEARWATER NATIONAL FOREST, 1933

Working Unit Number	Eradication Type	Acres	Effective Man Days	Number of Ribes Pulled				Gallons Spray	Per Acre Basis		
				Ribes lacustre	Ribes viscosissimum	Ribes petiolare	Total Ribes		Man Days	Ribes	Gals. Spray
1	Stream (hand)	507	310	58,092	4,468	15,726	78,286		.61	154	
	Stream (chemical	131	188					3,994	1.44		30
	All stream	507	498	58,092	4,468	15,726	78,286		.98	154	
2	Stream (hand)	33	49	14,075			14,075		1.48	427	
	Stream (chemical)	4	7					185	1.75		46
	All stream	33	56	14,075			14,075		1.70	427	
4	Stream (hand)	27	30	1,682	94	1,124	2,900		1.11	107	
	Stream (chemical)	9	17					385	1.89		43
	All stream	27	47	1,682	94	1,124	2,900		1.74	107	
5	Stream (hand)	12	10	838	13	1,674	2,525		.83	210	
6	Open mature	820	570	28,562	148,172		176,734		.70	216	
	Stream (hand)	25	73	5,431	48		5,479		2.92	219	
	All Types	845	643	33,993	148,220		182,213		.76	216	
All Units	Open mature	820	570	28,562	148,172		176,734		.70	216	
	Stream (hand)	604	472	80,118	4,623	18,524	103,265		.78	171	
	Stream (chemical)	144	212					4,564	1.47		32
	All stream	604*	684	80,118	4,623	18,524	103,265		1.13	171	
	All types	1,424	1,254	108,680	152,795	18,524	279,999		.88	197	

*Not included in checker's report.
Acres in stream type worked by both hand and chemical methods included only once in totals.

CHECKING RIBES ERADICATION WORK, 1933
CLEARWATER NATIONAL FOREST AND
CLEARWATER TIMBER PROTECTIVE ASSOCIATION

By

H. E. Swanson, Agent; H. J. Faulkner, Agent

The checking work was outlined to give the Ribes eradication forces immediate and detailed information on the amount and distribution of Ribes on the control areas both in advance of crews and following crew work to facilitate progress and to insure efficient work.

The organization consisted of a checking supervisor, 15 checker foremen and 45 checkers in the ECW camps. Checking on areas worked by NIRA crews was done in conjunction with checking areas worked by ECW crews.

Seventy percent of the time of the checkers was spent on checking work and the remaining thirty percent was spent on activities directly connected with Ribes eradication work, which included such activities as training men, supervising crews in the field, and special assistance to the camp boss.

On the basis of advance checking on 24,784 acres, 12,388 acres were eliminated from crew work as being low in Ribes population.

The following tables are given showing the results of the checking work:

Table No. 1. Final Checking Report on Blister Rust Control Areas, Clearwater National Forest, 1933.

Table No. 2. Classification of Blister Rust Control Areas by Feet of Live Stem per Acre by Eradication Types following Ribes Eradication, Clearwater National Forest, 1933.

Table No. 3. Final Checking Report on Blister Rust Control Areas, Clearwater Timber Protective Association, 1933.

Table No. 4. Classification of Blister Rust Control Areas by Feet of Live Stem per Acre by Eradication Types Following Ribes Eradication, Clearwater Timber Protective Association, 1933.

Note: Tables No. 2 and No. 4 represent a classification of the area by 2.5 acre units on the basis of a four percent sample check.

TABLE NO. 1

FINAL CHECKING REPORT ON BLISTER RUST CONTROL AREAS
CLEARWATER NATIONAL FOREST, 1933

Working Unit Number	Eradication Type	Worked Area: Number Acres Worked	Worked Area: Number Acres Checked	Worked Area: Percent Check	Advance Check Area: Number Acres in Area	Advance Check Area: Number Acres Eliminated From Crew Work	Advance Check Area: Number of Acres Checked	Advance Check Area: Percent Check	Total Acres Reported	Worked Area Ribes per Acre: Ribes lacustre Bu.	Ribes lacustre L.S.	Ribes viscosissimum Bu.	Ribes viscosissimum L.S.	Ribes petiolare Bu.	Ribes petiolare L.S.	All Species Bu.	All Species L.S.	Acres Eliminated On Basis of Advance Check Ribes per Acre: Ribes lacustre Bu.	Ribes lacustre L.S.	Ribes viscosissimum Bu.	Ribes viscosissimum L.S.	All Species Bu.	All Species L.S.
1	Open reproduction	531	22.2	4.2					531	1	9	5	13			5	22						
	Dense reproduction	1,541	57.8	3.7		550	14.8	4.0	2,091	1	7	1	3			1	10	1	9	1	5	2	13
	Open mature	2,685	106.2	4.0					2,685	1	5	1	2			1	7						
	Dense mature					135	4.8	4.0	135														
	All upland	4,757	186.2	3.9	1,997	685	19.6		5,442	1	6	1	3			1	10						
	Stream	598	36.3	6.1					598	1	6	1	1	2	13	4	19						
	All types	5,355	222.5	4.1	1,997	685	19.6	4.0	6,040	1	6	1	3	1	2	2	11	1	9	1	5	2	13
2	Dense reproduction	48	1.7	3.6					48	1	7					1	7						
	Open mature	211	8.7	4.1					211	3	22					3	22						
	All upland	259	10.4	4.1					259	3	19					3	19						
	Stream	33	4.2	13.0					33	1	2			2	18	3	21						
	All types	292	14.6	5.0					292	2	14			1	5	3	19						
4	Open reproduction	1,116	56.5	5.1					1,116	1	2	3	19			4	20						
	Open mature	665	23.9	3.6					665	1	2	1	14			2	16						
	All upland	1,781	80.4	4.5					1,781	1	2	3	17			3	19						
	Stream	200	14.7	7.4					200	2	9			1	3	3	12						
	All types	1,981	95.1	4.8					1,981	1	3	2	14	1	1	3	18						
5	Open reproduction	272	11.1	4.1					272	1	4	9	37			10	41						
	Open pole	312	14.6	4.7					312	1	4	2	12			3	16						
	Dense pole	44	1.7	3.9					44	1	12					1	12						
	Open mature	368	16.4	4.5					368	1	2	9	38			10	40						
	Cut-over	106	3.2	3.2					106			2	8			2	8						
	All upland	1,102	47.0	4.2					1,102	1	3	6	26			7	29						
	Stream	120	8.9	7.4					120	1	5			1	5	2	10						
	All types	1,222	55.9	4.8					1,222	1	3	5	22	1	1	6	26						
6	Open reproduction	337	11.1	3.3					337	19	79	18	88	2	5	38	173						
	Dense reproduction	191	4.2	3.2					191	15	100	1	8			16	108						
	Open pole	723	28.1	3.8					723	7	32	4	22			11	52						
	Dense pole	47	1.6	3.4					47	16	78					16	78						
	Open mature	4,865	184.7	3.8		651	26.7	4.0	5,516	63	291	31	203	1	1	94	496	1	12	1	1	2	13
	Dense mature	299	10.5	3.5		181	7.6	4.0	480	2	14					2	14	2	12			2	12
	All upland	6,462	240.2	3.7	3,516	832	34.3	4.0	7,294	50	231	25	160	1	1	76	392	2	12	1	1	2	13
	Stream	1,039	90.2	8.7					1,039	6	23	1	1	1	5	8	30						
	All types	7,501	330.4	4.4	3,516	832	34.6	4.0	8,333	44	202	21	138	1	1	66	341	2	12	1	1	2	13
12	Dense reproduction	360	14.0	3.9					360	1	2	11	93			11	95						
	Stream	101	7.8	7.7					101	1	14	1	1			1	16						
	All types	461	21.8	4.7					461	1	7	7	60			8	66						

In computing number of bushes and feet of live stem per acre, fractions were considered as whole numbers. Therefore, the computed number of bushes and live stem per acre for all species will in some cases show a smaller figure than the total when added across for all species.

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Data secured on 4 percent sample check.

TABLE NO. 2

CLASSIFICATION OF BLISTER RUST CONTROL AREAS BY FEET OF LIVE STEM PER ACRE BY ERADICATION TYPES FOLLOWING RIBES ERADICATION
CLEARWATER NATIONAL FOREST
1933

Acreage and Percentage of Acreage Worked by Eradication Crews Falling Within Each Feet of Live Stem Per Acre Class by Eradication Types

Working Unit Number	Eradication Type	0 Feet Number Acres	0 Feet Percent of Total	1-25 Feet Number Acres	1-25 Feet Percent of Total	26-50 Feet Number Acres	26-50 Feet Percent of Total	51-100 Feet Number Acres	51-100 Feet Percent of Total	101-150 Feet Number Acres	101-150 Feet Percent of Total	151-300 Feet Number Acres	151-300 Feet Percent of Total	301-500 Feet Number Acres	301-500 Feet Percent of Total	501-1,000 Feet Number Acres	501-1,000 Feet Percent of Total	1,001 Feet and Over Number Acres	1,001 Feet and Over Percent of Total	Total Acres
1	Open reproduction	443.5	83.5	25.0	4.7	22.5	4.2	12.5	2.4	5.0	.9	12.5	2.4			10.0	1.90			531.0
	Dense reproduction	1,458.5	94.7	10.0	.6	12.5	.8	25.0	1.0	5.0	.3	10.0	.6	10.0	.6	7.5	.50	2.5	.20	1,541.0
	Open mature	2,539.5	94.5	7.5	.3	42.5	1.6	25.0	.9	17.5	.7	32.5	1.2	17.5	.7	5.0	.20			2,685.0
	Dense mature																			
	All upland	4,439.5	93.3	42.5	.9	77.5	1.6	62.5	1.3	27.5	.6	55.0	1.2	27.5	.6	22.5	.45	2.5	.05	4,757.0
	Stream			598.0	100.0															598.0
	All types	4,439.5	82.9	640.5	12.0	77.5	1.5	62.5	1.1	27.5	.5	55.0	1.0	27.5	.5	22.5	.40	2.5	.05	5,355.0
2	Dense reproduction	46.0	100.0																	46.0
	Open mature	178.5	84.7	10.0	4.7	10.0	4.7			10.0	4.7			2.5	1.2					211.0
	All upland	226.5	87.3	10.0	3.9	10.0	3.9			10.0	3.9			2.5	1.0					259.0
	Stream			33.0	100.0															33.0
	All types	226.5	77.6	43.0	14.7	10.0	3.4			10.0	3.4			2.5	.9					292.0
4	Open reproduction	891.0	79.8	30.0	2.7	57.5	5.2	65.0	5.8	12.5	1.1	35.0	3.1	15.0	1.3	5.0	.50	5.0	.50	1,116.0
	Open mature	580.0	87.1	15.0	2.3	15.0	2.3	17.5	2.6	22.5	3.4	12.5	1.9	2.5	.4					665.0
	All upland	1,471.0	82.5	45.0	2.5	72.5	4.1	82.5	4.6	35.0	2.0	47.5	2.7	17.5	1.0	5.0	.30	5.0	.30	1,781.0
	Stream			200.0	100.0															200.0
	All types	1,471.0	74.2	245.0	12.3	72.5	3.6	82.5	4.2	35.0	1.8	47.5	2.4	17.5	.9	5.0	.30	5.0	.30	1,981.0
5	Open reproduction	162.0	59.6	12.5	4.6	42.5	15.6	27.5	10.1	7.5	2.8	15.0	5.5	2.5	.9	2.5	.90			272.0
	pole	234.5	75.2	20.0	6.4	15.0	4.8	25.0	8.0	10.0	3.2	7.5	2.4							312.0
	Dense pole	41.5	94.3									2.5	5.7							44.0
	Open mature	203.0	55.2	22.5	6.1	37.5	10.2	32.5	8.8	27.5	7.5	42.5	11.5	2.5	.7					368.0
	Cut-over	83.5	78.8	7.5	7.1	10.0	9.4			5.0	4.7									106.0
	All upland	724.5	65.8	62.5	5.7	105.0	9.5	85.0	7.7	50.0	4.5	67.5	6.1	5.0	.5	2.5	.20			1,102.0
	Stream			120.0	100.0															120.0
	All types	724.5	59.6	182.5	14.9	105.0	8.6	85.0	7.0	50.0	4.1	67.5	5.2	5.0	.4	2.5	.20			1,222.0
6	Open reproduction	104.5	31.0	17.5	5.2	32.5	9.6	42.5	12.6	42.5	12.6	47.5	14.1	10.0	3.0	27.5	8.20	12.5	3.70	337.0
	Dense reproduction	116.0	60.7	5.0	2.6	5.0	2.6	25.0	13.2			20.0	10.5			10.0	5.20	10.0	5.20	191.0
	Open pole	458.0	63.3	42.5	5.9	50.0	6.9	67.5	9.3	35.0	4.8	42.5	5.9	22.5	3.1	5.0	.80			723.0
	Dense pole	29.5	62.9	2.5	5.3			5.0	10.6			5.0	10.6			5.0	10.60			47.0
	Open mature	3,107.5	63.9	312.5	6.4	362.5	7.5	357.5	7.3	180.0	3.7	252.5	5.2	147.5	3.0	90.0	1.90	55.0	1.10	4,865.0
	Dense mature	274.0	91.6	7.5	2.5	12.5	4.2							5.0	1.7					299.0
	All upland	4,089.5	63.3	387.5	6.0	462.5	7.2	497.5	7.7	257.5	4.0	367.5	5.7	185.0	2.8	137.5	2.10	77.5	1.20	6,462.0
	Stream			335.0	32.2	704.0	67.8													1,039.0
	All types	4,089.5	54.6	722.5	9.6	1,166.5	15.6	497.5	6.6	257.5	3.4	367.5	4.9	185.0	2.5	137.5	1.80	77.5	1.00	7,501.0
12	Dense reproduction	185.0	51.4	20.0	5.6	22.5	6.3	30.0	8.3	35.0	9.7	42.5	11.8	17.5	4.9	5.0	1.40	2.5	.70	360.0
	Stream			101.0																101.0
	All types	185.0	40.2	121.0	26.2	22.5	4.9	30.0	6.5	35.0	7.6	42.5	9.2	17.5	3.8	5.0	1.10	2.5	.50	461.0
All Units	Open reproduction	1,601.0	70.9	85.0	3.8	155.0	6.9	147.5	6.5	67.5	3.0	110.0	4.9	27.5	1.[illegible]	5.0	[illegible]	17.5	.80	2,256.0
	Dense reproduction	1,807.5	84.4	35.0	1.6	40.0	1.9	80.0	3.7	40.0	1.9	72.5	3.4	27.5	1.3	22.5	1.10	15.0	.70	2,140.0
	Open pole	692.5	66.9	62.5	6.0	65.0	6.3	92.5	8.9	45.0	4.3	50.0	4.8	22.5	2.3	5.0	.50			1,035.0
	Dense pole	71.0	78.1	2.5	2.7			5.0	5.5			7.5	8.2			5.0	5.50			91.0
	Open mature	6,606.5	75.1	367.5	4.2	467.5	5.3	432.5	4.9	257.5	2.9	340.0	3.9	172.5	2.0	95.0	1.10	55.0	.60	8,794.0
	Dense mature	274.0	91.6	7.5	2.5	12.5	4.2							5.0	1.7					299.0
	Cut-over	83.5	78.8	7.5	7.1	10.0	9.4			5.0	4.7									106.0
	All upland	11,136.0	75.6	567.5	3.9	750.0	5.1	757.5	5.2	415.0	2.8	580.0	3.9	255.0	1.7	172.5	1.20	87.5	.60	14,721.0
	Stream			1,387.0	66.3	704.0	33.7													2,091.0
	All types	11,136.0	66.4	1,954.5	11.6	1,454.0	8.7	757.5	4.5	415.0	2.3	580.0	3.5	255.0	1.5	172.5	1.00	87.5	.50	16,812.0

Acreage and Percentage of Acreage Eliminated from Crew Work on Basis of Advance Check Falling Within Each Feet of Live Stem Per Acre Class by Eradication Types

Working Unit Number	Eradication Type	0 Feet Number Acres	0 Feet Percent of Total	1-25 Feet Number Acres	1-25 Feet Percent of Total	26-50 Feet Number Acres	26-50 Feet Percent of Total	51-100 Feet Number Acres	51-100 Feet Percent of Total	101-150 Feet Number Acres	101-150 Feet Percent of Total	151 Feet and Over Number Acres	151 Feet and Over Percent of Total	Total Acres
1	Dense reproduction	470.0	85.5	5.0	.9	10.0	1.8	35.0	6.4	10.0	1.8	20.0	3.6	550.0
	Dense mature	132.5	98.1	2.5	1.9									135.0
	All upland	602.5	88.0	7.5	1.1	10.0	1.5	35.0	5.1	10.0	1.5	20.0	2.8	685.0
	All types	602.5	88.0	7.5	1.1	10.0	1.5	35.0	5.1	10.0	1.5	20.0	2.8	685.0
6	Open mature	571.0	87.7	17.5	2.7	17.5	2.7	15.0	2.3	17.5	2.7	12.5	1.9	651.0
	Dense mature	153.5	84.8	5.0	2.8	5.0	2.7	15.0	8.3			2.5	1.4	181.0
	All upland	724.5	87.1	22.5	2.7	22.5	2.7	30.0	3.6	17.5	2.1	15.0	1.8	832.0
	All types	724.5	87.1	22.5	2.7	22.5	2.7	30.0	3.6	17.5	2.1	15.0	1.8	832.0
All Units	Dense reproduction	470.0	85.5	5.0	.9	10.0	1.8	35.0	6.4	10.0	1.8	20.0	3.6	550.0
	Open mature	571.0	87.7	17.5	2.7	17.5	2.7	15.0	2.3	17.5	2.7	12.5	1.9	651.0
	Dense mature	286.0	90.5	7.5	2.4	5.0	1.6	15.0	4.7			2.5	.8	316.0
	All upland	1,327.0	87.5	30.0	2.0	32.5	2.1	65.0	4.3	27.5	1.8	35.0	2.3	1,517.0
	All types	1,327.0	87.5	30.0	2.0	32.5	2.1	65.0	4.3	27.5	1.8	35.0	2.3	1,517.0

Data secured on 4 percent sample check.

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TABLE NO. 3

FINAL CHECKING REPORT ON BLISTER RUST CONTROL AREAS
CLEARWATER TIMBER PROTECTIVE ASSOCIATION, 1933

Working Unit Number	Eradication Type	Worked Area: Number Acres Worked	Worked Area: Number Acres Checked	Worked Area: Per-cent Check	Advance Check Area: Number Acres in Area	Advance Check Area: Number Acres Eliminated From Crew Work	Advance Check Area: Number of Acres Checked	Advance Check Area: Per-cent Check	Total Acres Reported	Worked Area Ribes Per Acre: R. lacustre Bushes	R. lacustre Live Stem	R. viscosissimum Bushes	R. viscosissimum Live Stem	R. petiolare Bushes	R. petiolare Live Stem	R. inerme Bushes	R. inerme Live Stem	All Species Bushes	All Species Live Stem	Acres Eliminated on Basis of Advance Check Ribes Per Acre: R. lacustre Bushes	R. lacustre Live Stem	R. viscosissimum Bushes	R. viscosissimum Live Stem	R. inerme Bushes	R. inerme Live Stem	All Species Bushes	All Species Live Stem
1	Open reproduction	632	31.6	5.0					632	1	2	5	26					6	28								
	Open pole	110	13.3	12.1					110	1	2	10	46					10	48								
	Open mature	9,120	375.6	4.1		3,661	150.8	4.1	12,781	1	7	1	13	1	1	1	1	1	21	1	12	1	10	1	1	2	25
	Dense mature	263	11.8	4.5		583	23.0	3.9	846	1	1	1	1					1	1	1	1	1	3			1	4
	Cut-over	1,861	73.1	3.9					1,861	1	4	5	11	1	1	1	1	6	15								
	Brush	436	17.4	4.0					436	3	19	14	196			1	6	18	222								
	All upland	12,422	523.0	4.2	4,527	4,244	173.8	4.1	16,666	1	6	2	20	1	1	1	1	3	27	1	11	1	10	1	2	2	22
	Stream	1,519	89.3	5.9					1,519	4	15	1	1	2	15	1	1	6	32								
	All types	13,941	612.3	4.3	4,527	4,244	173.8	4.1	18,185	1	8	2	17	1	2	1	1	4	28	1	11	1	10	1	2	2	22
2	Cut-over	1,079	37.6	3.5					1,079	1	1	3	14			1	1	4	15								
	Brush	139	5.1	3.7					139			7	51					7	51								
	All upland	1,218	42.7	3.5					1,218	1	1	5	19			1	1	5	19								
	Stream	78	1.3	1.7					78	5	46			7	176			11	222								
	All types	1,296	44.0	3.4					1,296	1	1	4	18	1	5	1	1	5	25								
6	Open reproduction	1,342	48.6	3.6					1,342	4	14	16	70					19	84								
	Dense reproduction	112	5.5	4.9					112	1	3	15	70					16	72								
	Open mature	4,993	222.4	4.4		1,909	79.2	4.1	6,902	5	48	1	16	1	1			6	64	3	30	1	5			3	35
	Dense mature					27	1.1	4.1	27											1	4					1	4
	Cut-over	1,238	70.4	5.7		2,331	97.3	4.2	3,569	4	26	1	4	1	1			6	31	2	47	5	17			6	64
	All upland	7,685	346.9	4.5	7,196	4,267	177.6	4.2	11,952	5	38	3	22	1	1			8	60	2	39	3	12			5	51
	Stream	1,577	130.1	8.3					1,577	6	32	1	1	2	9			8	42								
	All types	9,262	447.0	4.8	7,196	4,267	177.6	4.2	13,529	5	39	3	17	1	3			9	59	2	39	3	12			5	51
8	Open reproduction	180	7.9	4.4					180	11	49	3	21	1	2			15	72								
	Dense reproduction	38	1.7	4.5					38	1	5	2	18					3	23								
	Open pole	394	21.3	5.4					394	5	17	1	1					5	18								
	Open mature	5,255	226.8	4.4		557	22.5	4.0	5,812	2	28	1	2	1	1			2	30	6	27	1	2			6	29
	Dense mature	498	23.6	4.7		452	17.7	3.9	950	1	5	1	3					1	8	5	28	1	3			5	31
	All upland	6,365	283.3	4.4	3,878	1,009	40.2	4.0	7,374	3	26	1	2	1	1			3	29	5	28	1	3			6	30
	Stream	1,699	137.2	8.1					1,699	6	21			4	18			10	39								
	All types	8,064	420.5	5.2	3,878	1,009	40.2	4.0	9,073	4	24	1	2	1	4			5	32	5	28	1	3			6	30
10	Open reproduction	3,902	152.5	3.9					3,902	1	4	2	16	1	1			3	19								
	Dense reproduction	51	2.4	4.7					51	3	15							3	15								
	Open pole	195	4.3	2.2					195	2	5							2	5								
	Dense pole	79	12.8	16.2					79	1	1	1	3					1	4								
	Open mature	879	33.1	3.8					879	2	17	1	1	1	12			3	30								
	Dense mature	386	19.1	4.9					386	1	1	2	10					2	11								
	Cut-over	2,717	99.6	3.7					2,717	1	4	3	10	1	1	1	1	4	14								
	All upland	8,209	323.8	3.9					8,209	1	5	2	11	1	1	1	1	3	18								
	Stream	514	44.7	8.7					514	2	7	1	1	1	6	1	1	4	15								
	All types	8,723	368.5	4.2					8,723	1	5	2	10	1	2	1	1	3	17								
12	Open reproduction	227	10.1	4.4					227	2	6	3	12	1	10			6	29								
	Open pole	593	20.8	3.5					593	2	18	2	18					5	36								
	Dense pole	31	1.4	4.5					31	4	10	1	2					5	12								
	Open mature	2,162	64.3	3.0		1,283	51.5	4.0	3,445	1	1	1	1					1	2	5	47	5	23			9	70
	Dense mature					68	2.8	4.1	68																		
	Cut-over	75	3.1	4.1					75	1	5	3	36					3	40								
	All upland	3,086	99.7	3.2	1,670	1,351	54.3	4.0	4,439	1	5	1	7	1	1			2	13	5	47	5	23			9	70
	Stream	493	46.9	9.5					493	3	11	1	1	3	21			6	32								
	All types	3,581	146.6	4.1	1,670	1,351	54.3	4.0	4,932	2	7	1	5	1	7			3	19	5	47	5	23			9	70
13	Open reproduction	33	1.2	3.6					33																		
	Dense reproduction	1,184	51.9	4.4					1,184	1	7	5	18	1	1			6	25								
	Open pole	53	2.1	4.0					53																		
	Open mature	7,610	332.4	4.4					7,610	1	8	1	1					1	9								
	All upland	8,880	387.6	4.4	2,000				8,880	1	8	1	3	1	1			2	11								
	Stream	772	74.0	9.6					772	3	10	1	1	1	14	1	3	5	27								
	All types	9,652	461.6	4.8	2,000				9,652	1	8	1	2	1	2	1	1	2	14								

Data secured on 4 percent sample check.

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TABLE NO. 4

CLASSIFICATION OF BLISTER RUST CONTROL AREAS BY FEET OF LIVE STEM PER ACRE BY ERADICATION TYPES FOLLOWING RIBES ERADICATION
CLEARWATER TIMBER PROTECTIVE ASSOCIATION, 1933

Acreage and Percentage of Acreage Worked by Eradication Crews Falling Within Each Feet of Live Stem Per Acre Class by Eradication Types

Working Unit Number	Eradication Type	0 Feet Number Acres	0 Feet Per cent of Total	1-25 Feet Number Acres	1-25 Feet Per cent of Total	26-50 Feet Number Acres	26-50 Feet Per cent of Total	51-100 Feet Number Acres	51-100 Feet Per cent of Total	101-150 Feet Number Acres	101-150 Feet Per cent of Total	151-300 Feet Number Acres	151-300 Feet Per cent of Total	301-500 Feet Number Acres	301-500 Feet Per cent of Total	501-1000 Feet Number Acres	501-1000 Feet Per cent of Total	1001 Feet and Over Number Acres	1001 Feet and Over Per cent of Total	Total Acres
1	Open reproduction	464.5	73.3	17.5	2.8	15.0	2.4	37.5	5.9	20.0	3.2	25.0	4.0	22.5	3.6	22.5	3.6	7.5	1.2	632
	Open pole	87.5	79.6	5.0	4.5	2.5	2.3	5.0	4.5	2.5	2.3			2.5	2.3	5.0	4.5			110
	Open mature	8,400.0	92.1	110.0	1.2	160.0	1.8	152.5	1.7	85.0	.9	115.0	1.3	55.0	.6	30.0	.3	12.5	.1	9,120
	Dense mature	243.0	92.3	7.5	2.9	2.5	1.0	5.0	1.9			5.0	1.9							263
	Cut-over	1,396.0	75.0	175.0	9.4	167.5	9.0	72.5	3.9	12.5	.7	22.5	1.2	7.5	.4	5.0	.3	2.5	.1	1,861
	Brush	248.5	57.0	5.0	1.1	17.5	4.0	30.0	6.9	15.0	3.4	25.0	5.7	32.5	7.5	30.0	6.9	32.5	7.5	436
	All upland	10,839.5	87.3	320.0	2.6	365.0	2.9	302.5	2.4	135.0	1.1	192.5	1.6	120.0	1.0	92.5	.7	55.0	.4	12,422
	Stream					1,519.0	100.0													1,519
	All types	10,839.5	[illegible]	320.0	2.3	1,884.0	13.5	302.5	2.2	135.0	1.0	192.5	1.4	120.0	.9	92.5	.7	55.0	.4	13,941
2	Cut-over	871.5	80.8	40.0	3.7	55.0	5.1	65.0	6.0	17.5	1.6	17.5	1.6	10.0	.9	2.5	.2			1,079
	Brush	109.0	78.4	5.0	3.6	7.5	5.4	5.0	3.5	2.5	1.8	2.5	1.8	2.5	1.8	5.0	3.6			139
	All upland	980.5	80.6	45.0	3.7	62.5	5.1	70.0	5.8	20.0	1.6	20.0	1.6	12.5	1.0	7.5	.6			1,218
	Stream											78.0	100.0							78
	All types	980.5	75.6	45.0	3.5	62.5	4.5	[illegible]	[illegible]	[illegible]	1.5	98.0	7.6	12.5	1.0	7.5	.6			1,296
6	Open reproduction	492.0	36.6	112.5	8.4	177.5	13.2	215.0	16.0	87.5	6.5	132.5	9.9	75.0	5.6	45.0	3.4	5.0	.4	1,343
	Dense reproduction	34.5	30.7	22.5	20.1	20.0	17.9	12.5	11.2	10.0	8.9	5.0	4.5	5.0	4.5	2.5	2.2			112
	Open mature	3,560.0	71.3	165.0	3.3	298.0	6.0	307.5	6.1	152.5	3.0	262.5	5.3	110.0	2.2	60.0	1.2	77.5	1.6	4,993
	Dense mature																			
	Cut-over	816.0	66.2	57.5	4.6	140.0	11.3	100.0	8.1	42.5	3.4	50.0	4.0	15.0	1.2	10.0	.8	5.0	.4	1,238
	All upland	4,904.5	63.7	357.5	4.7	635.5	8.3	635.0	8.3	232.5	3.0	450.0	5.9	205.0	2.7	117.5	1.5	87.5	1.1	7,685
	Stream					1,577.0	100.0													1,577
	All types	4,904.5	52.9	357.5	3.9	2,212.5	23.9	635.0	6.8	232.5	2.5	450.0	4.9	205.0	2.2	117.5	1.3	87.5	.9	9,262
8	Open reproduction	90.0	50.0	5.0	2.8	17.5	9.7	22.5	12.5	15.0	8.3	22.5	12.5	7.5	4.2					180
	Dense reproduction	38.0	100.0																	38
	Open pole	336.5	85.4	5.0	1.3	22.5	5.7	12.5	3.2	2.5	.6	10.0	2.5	5.0	1.3					394
	Open mature	4,000.5	76.2	247.5	4.7	380.0	7.2	216.5	4.2	147.5	2.8	127.5	2.4	62.5	1.2	50.0	1.0	15.0	.3	5,256
	Dense mature	423.0	85.0	12.5	2.5	25.0	5.0	12.5	2.5	12.5	2.5	12.5	2.5							498
	All upland	4,894.0	76.9	270.0	4.2	445.0	7.0	266.0	4.2	177.5	2.8	172.5	2.7	75.0	1.2	50.0	.8	15.0	.2	6,365
	Stream					1,699.0	100.0													1,699
	All types	4,894.0	60.7	270.0	3.4	2,144.0	26.6	266.0	3.3	177.5	2.2	172.5	2.1	75.0	.9	50.0	.6	15.0	.2	8,064
10	Open reproduction	3,309.5	84.8	160.0	4.1	167.5	4.3	125.0	3.2	52.5	1.3	50.0	1.3	22.5	.6	12.5	.3	2.5	.1	3,902
	Dense reproduction	43.5	85.3			5.0	9.8					2.5	4.9							51
	Open pole	170.0	87.2	7.5	3.8	12.5	6.4			5.0	2.6									195
	Dense pole	76.5	96.8			2.5	3.2													79
	Open mature	749.0	85.2	15.0	1.7	50.0	5.7	25.0	2.8	10.0	1.1	17.5	2.0	2.5	.3	2.5	.3	7.5	.9	879
	Dense mature	343.5	88.9	10.0	2.6	10.0	2.6	5.0	1.3	2.5	.7	12.5	3.2	2.5	.7					386
	Cut-over	2,277.0	83.8	112.5	4.1	110.0	4.0	130.0	4.8	45.0	1.7	32.5	1.2	2.5	.1	7.5	.3			2,717
	All upland	6,969.0	84.9	[illegible]	3.7	357.5	4.4	288.0	3.5	115.0	1.4	115.0	1.4	30.0	.4	22.5	.3	10.0	.1	8,209
	Stream			514.0	100.0															514
	All types	6,969.0	79.9	819.0	9.4	357.5	4.1	288.0	3.3	115.0	1.3	115.0	1.3	30.0	.3	22.5	.3	10.0	.1	8,723
12	Open reproduction	159.5	70.3	10.0	4.4	27.5	12.1	15.0	6.6	2.5	1.1	7.5	3.3	2.5	1.1	2.5	1.1			227
	Open pole	453.0	76.4	22.5	3.8	50.0	8.4	32.5	5.5	7.5	1.2	10.0	1.7	10.0	1.7	5.0	.8	2.5	.4	593
	Dense pole	26.0	83.9			5.0	16.1													31
	Open mature	1,569.5	72.6	85.0	3.9	170.0	7.9	145.0	6.7	90.0	4.2	62.5	2.9	27.5	1.3	12.5	.6			2,162
	Dense mature																			
	Cut-over	60.0	80.1	7.5	10.0	2.5	3.3	2.5	3.3			2.5	3.3							75
	All upland	2,268.0	73.5	125.0	4.0	255.0	8.3	135.0	6.3	100.0	3.2	82.5	2.7	40.0	1.3	20.0	.6	2.5	.1	3,088
	Stream					493.0	100.0													493
	All types	2,268.0	63.3	125.0	3.5	748.0	20.9	135.0	5.4	100.0	2.8	82.5	2.3	40.0	1.1	20.0	.6	2.5	.1	3,581
13	Open reproduction	33.0	100.0																	33
	Dense reproduction	969.0	81.9	25.0	2.1	40.0	3.4	45.0	3.8	35.0	2.9	37.5	3.2	22.5	1.9	10.0	.9			1,184
	Open pole	53.0	100.0																	53
	Open mature	7,277.5	95.4	72.5	1.0	70.0	.9	45.0	.6	27.5	.4	57.5	.8	27.5	.4	20.0	.3	12.5	.2	7,610
	All upland	8,332.5	93.9	97.5	1.1	110.0	1.2	90.0	1.0	62.5	.7	95.0	1.1	50.0	.6	30.0	.3	12.5	.1	8,880
	Stream					772.0	100.0													772
	All types	8,332.5	86.4	97.5	1.0	882.0	9.1	90.0	.9	62.5	.7	95.0	1.0	50.0	.5	30.0	.3	12.5	.1	9,652
All Units	Open reproduction	[illegible]	72.0	305.0	4.8	405.0	6.4	415.0	6.6	177.5	2.9	237.5	3.9	130.0	2.1	82.5	1.3	15.0	.2	6,316
	Dense reproduction	[illegible]	78.2	47.5	3.4	65.0	4.7	57.5	4.2	45.0	3.3	45.0	3.3	27.5	2.0	12.5	.9			1,386
	Open pole	1,100.0	81.8	40.0	3.0	87.5	6.5	50.0	3.7	17.5	1.3	20.0	1.5	17.5	1.3	10.0	.7	2.5	.2	1,345
	Dense pole	102.5	93.2			7.5	6.8													110
	Open mature	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.0	175.0	.6	125.0	.4	[illegible]
	Dense mature	1,009.5	88.0	30.0	2.6	37.5	3.3	22.5	2.0	15.0	1.3	30.0	2.6	2.5	.2					1,147
	Cut-over	5,422.5	77.8	392.5	5.6	475.0	6.8	[illegible]	[illegible]	[illegible]	1.7	125.0	1.8	35.0	.5	25.0	.4	7.5	.1	6,970
	Brush	357.5	62.2	10.0	1.7	25.0	4.3	35.0	6.1	17.5	3.0	27.5	4.8	35.0	6.1	35.0	6.1	32.5	5.7	575
	All upland	[illegible]	81.7	1,520.0	3.2	2,230.5	4.7	1,843.5	3.9	902.5	1.9	1,127.5	2.4	532.5	1.1	340.0	.7	182.5	.4	47,867
	Stream			514.0	7.7	6,060.0	91.1					78.0	1.2							6,652
	All types	39,188.0	71.9	2,034.0	3.7	[illegible]	[illegible]	[illegible]	3.4	902.5	1.7	1,205.5	2.2	532.5	1.0	340.0	.6	182.5	.3	54,519

Acreage and Percentage of Acreage Eliminated from Crew Work on Basis of Advance Check Falling Within Each Feet of Live Stem Per Acre Class by Eradication Types

Working Unit Number	Eradication Type	0 Feet Number Acres	0 Feet Per cent of Total	1-25 Feet Number Acres	1-25 Feet Per cent of Total	26-50 Feet Number Acres	26-50 Feet Per cent of Total	51-100 Feet Number Acres	51-100 Feet Per cent of Total	101-500 Feet Number Acres	101-500 Feet Per cent of Total	151 Feet and Over Number Acres	151 Feet and Over Per cent of Total	Total Acres
1	Open mature	3,348.5	91.4	52.5	1.4	55.0	1.5	90.0	2.5	25.0	.7	90.0	2.5	3,661
	Dense mature	533.0	91.5	7.5	1.3	10.0	1.7	10.0	1.7	10.0	1.7	12.5	2.1	583
	All upland	3,881.5	91.5	60.0	1.4	65.0	1.5	100.0	2.4	35.0	.8	102.5	2.4	4,244
	All types	3,881.5	91.5	60.0	1.4	65.0	1.5	100.0	2.4	35.0	.8	102.5	2.4	4,244
6	Open mature	1,826.5	95.7	7.5	.4	15.0	.8	30.0	1.6	5.0	.2	25.0	1.3	1,909
	Dense mature	27.0	100.0											27
	Cut-over	2,031.0	87.1	65.0	2.8	87.5	3.8	80.0	3.4	17.5	.8	50.0	2.1	2,331
	All upland	3,884.5	91.0	72.5	1.7	102.5	2.4	110.0	2.6	22.5	.5	75.0	1.8	4,267
	All types	3,884.5	91.0	72.5	1.7	102.5	2.4	110.0	2.6	22.5	.5	75.0	1.8	4,267
8	Open mature	502.0	90.0	2.5	.5	7.5	1.4	12.5	2.2	2.5	.5	30.0	5.4	557
	Dense mature	419.5	92.7	2.5	.6	7.5	1.7	2.5	.6			20.0	4.4	452
	All upland	921.5	91	[illegible]	.5	15.0	[illegible]	15.0	1.5	2.5	.3	50.0	5.0	1,009
	All types	921.5	91.2	5.0	.5	15.0	1.5	15.0	1.5	2.5	.3	50.0	5.0	1,009
12	Open mature	1,133.0	88.2	15.0	1.2	17.5	1.4	22.5	1.8	7.5	.6	87.5	6.8	1,283
	Dense mature	68.0	100.0											68
	All upland	1,201.0	88.9	15.0	1.1	17.5	1.3	22.5	1.7	7.5	.5	87.5	6.5	1,351
	All types	1,201.0	88.9	15.0	1.1	17.5	1.3	22.5	1.7	7.5	.5	87.5	6.5	1,351
All Units	Open mature	[illegible]	92.0	77.5	1.0	95.0	1.3	155.0	2.1	40.0	.5	232.5	3.1	7,410
	Dense mature	1,047.5	92.7	10.0	.9	17.5	1.5	12.5	1.1	10.0	.9	32.5	2.9	1,130
	Cut-over	2,031.0	87.1	65.0	2.8	87.5	3.8	80.0	3.4	17.5	.8	50.0	2.1	2,331
	All upland	9,886.5	91.0	152.5	1.4	200.0	1.8	247.5	2.3	67.5	.6	315.0	2.9	10,671
	All types	9,886.5	91.0	152.5	1.4	200.0	1.5	247.5	2.3	67.5	.6	315.0	2.9	10,671

Annual Report 1933
F. J. Faulkner

Data Secured on 4 Percent Sample Check

W-1229. Stream bottom area before slashing on lower Merry Creek in which R. inerme and other species of Ribes are very abundant, practically massed in places.

RIBES ERADICATION, ST. JOE PROJECT

By
H. J. Hartman, Junior Forester
Division of Blister Rust Control
and
Neil Fullerton, Junior Forester
U. S. Forest Service

INTRODUCTION

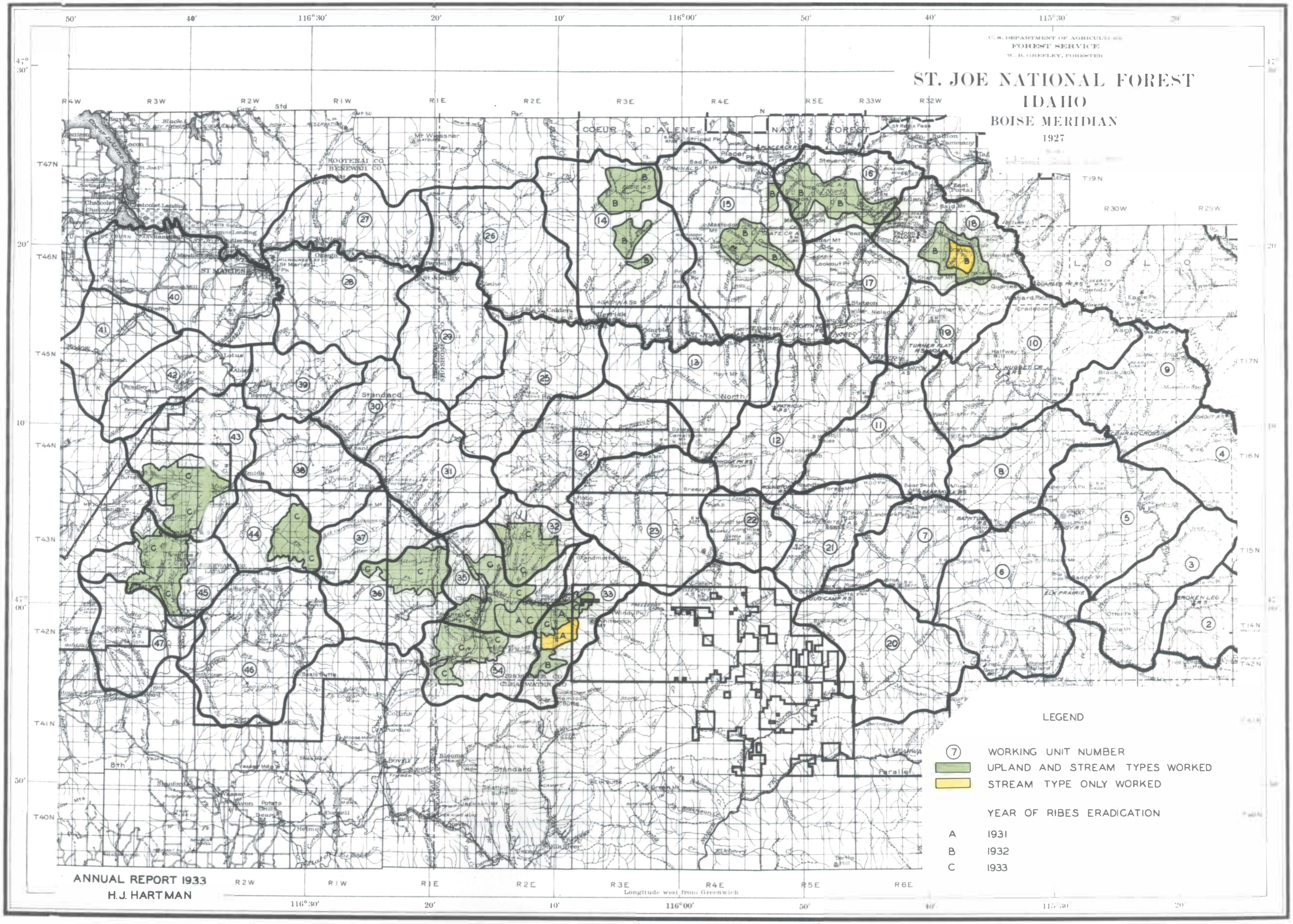
For economical and administrative reasons the St. Joe project now includes all of the main division of the St. Joe National Forest, the Palouse Division of the St. Joe National Forest, the former Coeur d'Alene Timber Protective Association, and the Potlatch Timber Protective Association. The Potlatch Timber Protective Association is the only part of the project that is not at present under Forest Service administration; therefore, Ribes eradication data are kept separate for this area. Ribes eradication, on a small scale, was started on the Potlatch Timber Protective Association in 1928 and was continued through 1931. This work was confined chiefly to stream type Ribes eradication as a delay measure against the invasion of blister rust. Work in the Clarkia region of the former Coeur d'Alene Timber Protective Association was started in 1931 and continued through 1932. This was a small scale program, and the work was also confined chiefly to stream type Ribes eradication as a delay measure against the further spread of blister rust already present. An intensive Ribes eradication program was started in the Avery region of the main St. Joe National Forest in 1932. Both stream and upland types were freed from Ribes, and the work was confined chiefly to the protection of valuable western white pine plantations.

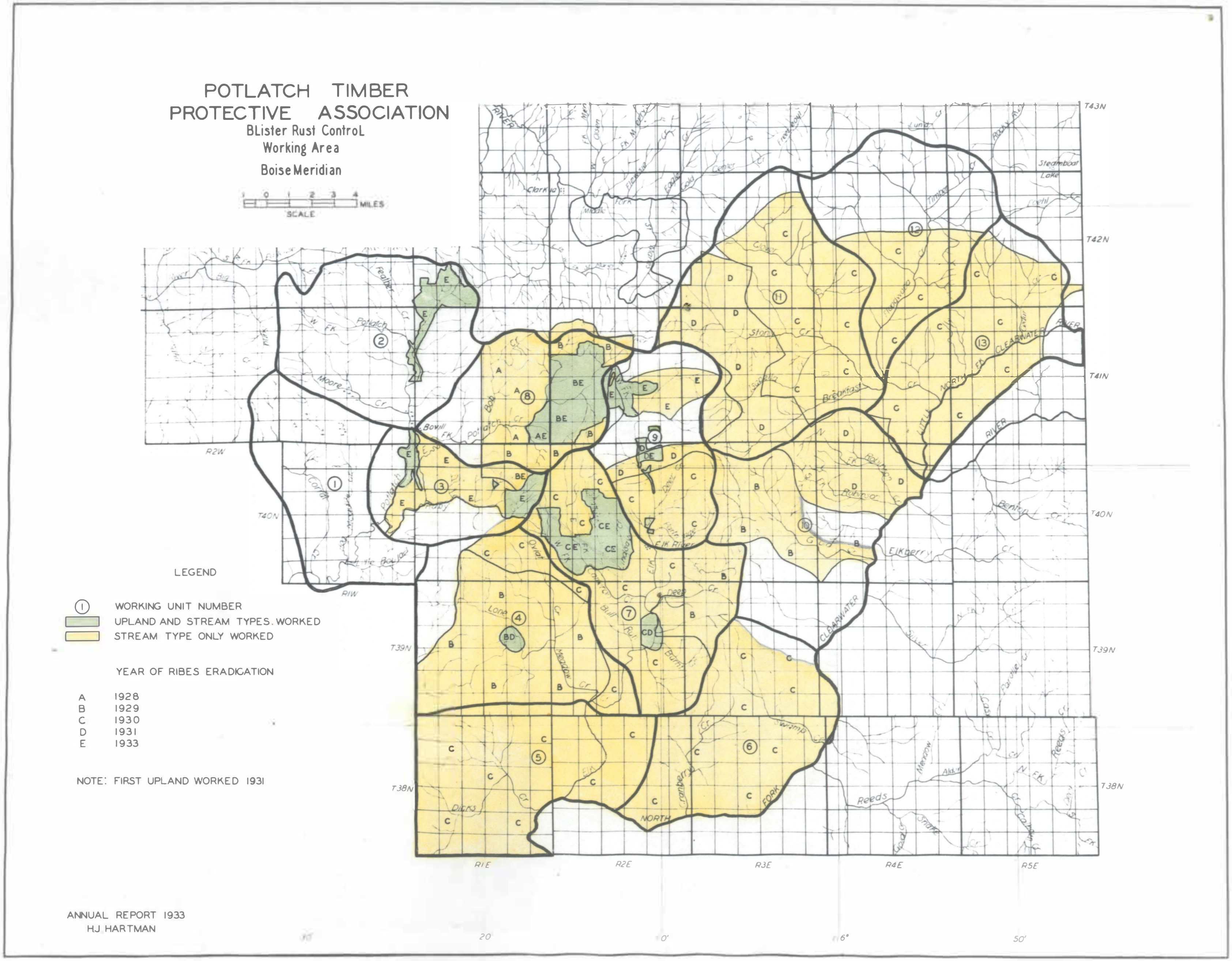
The 1933 Ribes eradication program on the St. Joe project called for the complete eradication of Ribes from the best young white pine stands in the region. The operation consisted of fourteen ECW camps and seven NIRA 50-man camps of the Division of Blister Rust Control. Three of the ECW camps were located on the western portion of the Palouse Division of the St. Joe National Forest. five in the general vicinity of Clarkia, and six in the Bovill-Elk River region of the Potlatch Timber Protective Association. Nine of these camps were Forest Service camps, three were private camps, and two were Idaho state camps. All NIRA camps were located in the Clarkia region, and work started August 28.

GENERAL DESCRIPTION OF AREAS

Western Portion of Palouse Division

This area includes working units 43, 44 and 45. Although this area lies along the western edge of the Inland Empire white pine belt, it supports, chiefly, an excellent dense pole and reproduction stand of white pine. *Ribes lacustre* occurred in medium concentrations along the streams. *Ribes inerme*, *R. lacustre* and *R. viscosissimum* were found in light concentrations in the pole and mature types, and in medium to heavy concentrations in the open reproduction, recently burned and cut-over areas. No *R. petiolare* was found in the area. Average working conditions prevailed.


U. S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
W. B. GREELEY, FORESTER
ST. JOE NATIONAL FOREST
IDAHO
BOISE MERIDIAN
1927
LEGEND
WORKING UNIT NUMBER
UPLAND AND STREAM TYPES WORKED
STREAM TYPE ONLY WORKED
YEAR OF RIBES ERADICATION
A 1931
B 1932
C 1933
ANNUAL REPORT 1933
H.J. HARTMAN
Longitude west from Greenwich


POTLATCH TIMBER PROTECTIVE ASSOCIATION
BLister Rust ControL
Working Area
Boise Meridian
SCALE
MILES
LEGEND
WORKING UNIT NUMBER
UPLAND AND STREAM TYPES. WORKED
STREAM TYPE ONLY WORKED
YEAR OF RIBES ERADICATION
A 1928
B 1929
C 1930
D 1931
E 1933
NOTE: FIRST UPLAND WORKED 1931
ANNUAL REPORT 1933
HJ HARTMAN
T43N
T42N
T41N
T40N
T39N
T38N
R2W
R1W
R1E
R2E
R3E
R4E
R5E
CLEARWATER
NORTH FK
RIVER
Steamboat Lake
Potlatch
Bovill
Elk River
Breakfast
Reeds
Benton
Elkberry
Cranberry

Clarkia Area

This area, which includes working units 32, 33, 34, 35 and 36, supports the highest quality and most extensive block of second growth white pine on the project. Unfortunately, this area also presented one of the most severe and perplexing Ribes eradication problems ever encountered. The difficulty occurred chiefly in the stream type Ribes eradication where R. inerme, R. lacustre and R. petiolare existed in very heavy concentrations inter-mixed with willow, alder and hawthorne throughout the wide belts of stream type. A large part of the upland type was moderately free from Ribes, although several blocks of open timber type contained heavy concentrations of R. viscosissimum and R. lacustre amounting to as many as 10,000 bushes per acre.

Bovill-Elk River Area

Working units 2, 3, 7, 8, and 9 of the Potlatch Timber Protective Association are included in this area. Nearly all of this area has been cut over and burned. However, a large portion of this area now supports excellent open white pine reproduction, except working unit 8 which supports a large solid block of young mature white pine. This area, in general, represented a difficult Ribes eradication problem, due to the wide belts of stream type which contained heavy concentrations of R. petiolare, R. inerme and R. lacustre. A large part of the cut-over and burned upland areas supported very heavy concentrations of R. viscosissimum and R. lacustre. This was particularly true of the Elk Creek Drainage.

ORGANIZATION AND ADMINISTRATION

ECW Camps

A forest officer of the St. Joe National Forest and a member of the Division of Blister Rust Control were jointly in charge of the project. The responsibility and duties of the forest officer were mainly those pertaining to organization and maintenance of ECW camps. The project supervisor from the Division of Blister Rust Control was mainly responsible for the technical supervision of the work in the field.

The project was divided into three administrative units: the Palouse Division, the Clarkia area, and the Bovill-Elk River area. Each of these areas was headed by a unit supervisor who assisted the project supervisors by assuming direct control over limited numbers of camps.

Each of the ECW camps had the usual Army personnel, with the field work being under the direct supervision of a camp superintendent assisted by either six or seven foremen. The camp superintendents and foremen were all experienced woodsmen, and were acquainted with the problems of handling large crews of men. The checking organization was composed of four checkers and one checking foreman in each camp, and was headed by a checking supervisor for the project. The checking supervisor was directly in charge of the checking on the job, and worked in close cooperation with the project and unit supervisors. Through the use of advance check methods about 30 percent of the area assigned to the ECW camps was eliminated as having so few Ribes as not to need working now.

The machinery of the organization was so set up and administered as to give full cooperation to the Army personnel at all times.

A-765. General view of slashed area on lower Merry Creek near Clarkia, Idaho. Upland area supports excellent stands of immature white pine. ECW camp in foreground.
Official photograph, 116th Photo Section, W. N. G.

NIRA 50-man Camps

The seven NIRA camps were financed and managed by the Division of Blister Rust Control. The project supervisor from the Division of Blister Rust Control, in charge of the technical supervision of the field work of the ECW camps, was directly in charge of the NIRA program and was assisted by a unit supervisor. One camp superintendent and two foremen were assigned to each camp. The camp superintendent gave general field supervision and managed the camp. The foremen were each assigned twenty-five men, and spent their full time in the field with the crews. The ECW checking organization conducted the checking on the NIRA camp areas.

PERSONNEL

ECW Camps

The personnel in each of these camps, with the exception of the supervision and the local quota men, was composed of men from New York and New Jersey. The largest percentage, however, were from New York City. All were inexperienced, and very few of them had ever performed manual labor.

NIRA Camps

These camps were made up entirely of local men. The larger part of the supervision was drawn from the ranks of the regular blister rust camps which were operating in the Coeur d'Alene National Forest. About half of the labor was drawn from Spokane, Washington, the remaining portion came from small nearby towns. Nearly all of the laborers, although lacking blister rust control training, were well equipped with woods experience. The camps, from the beginning, turned out a large amount of high quality work.

METHODS AND EQUIPMENT

ECW Camps

Three methods of Ribes eradication were used on the project, namely: hand pulling, chemical eradication, and slashing and burning. For hand pulling, the standard 3-man crew was used whenever capable crew leaders could be developed; however, it was often necessary to use six and eight-man crews due to the lack of reliable crew leaders. Each foreman kept his crews closely grouped in order to give as close supervision as possible. All crews worked up and down the slopes whenever possible.

Atlacide, at the rate of 1.5 pounds per gallon of water, was the chief chemical used for spraying. Some sodium chlorate was used for late season spraying and was applied at the same rate as the Atlacide. The chemical was applied to *R. petiolare* and *R. inerme* by 5-man crews using the regulation knapsack spray outfit.

The wide belts of stream type which supported dense concentrations of *R. inerme* and *R. petiolare* growing in close association with very heavy brush were worked by the slashing and burning method. A slashing crew consisted of 25 men headed by a foreman. Only the most difficult areas which were not suitable for chemical work were worked by the slashing and burning method. All Ribes were pulled along with the slashing. The Pulaski was found to be the most desirable tool for this method.

NIRA Camps

Hand pulling, and slashing and burning were the only Ribes eradication methods employed at NIRA camps. The standard 3-man crew was used in hand pulling work. Hard frosts and heavy rains made the late season work very difficult.

ANALYSIS OF COSTS

STATEMENT OF ECW EXPENDITURES FROM REGULAR B.R.C. ALLOTMENTS
ST. JOE PROJECT

Forest Service:

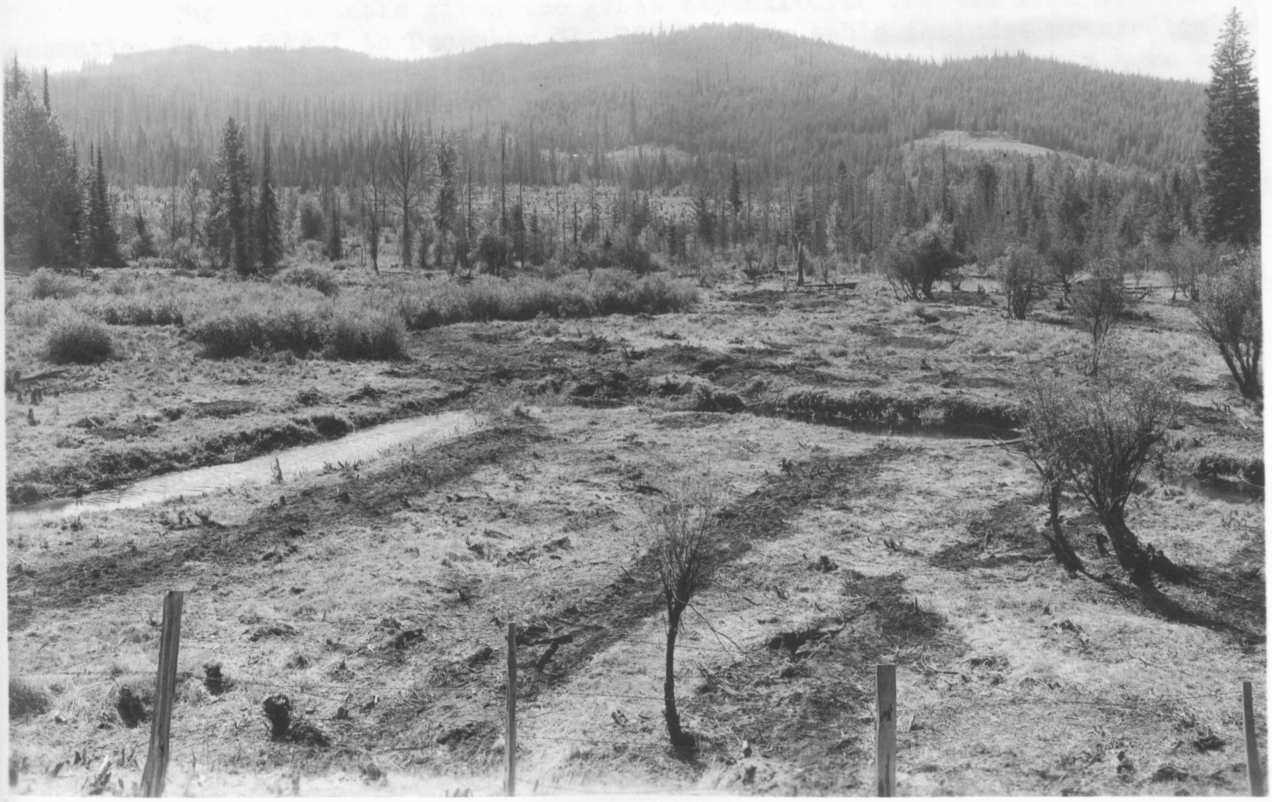
Salaries	$3,896.06	
Subsistence	3,844.43	
Transportation	290.08	
Equipment	1,008.33	
Total		$9,038.90

Division of Blister Rust Control:

Salaries	$7,341.45	
Subsistence	1,581.23	
Transportation	2,356.81	
Equipment	4,367.50	
Total		$15.646.99
Grand Total		$24,685.89

The subsistence cost for the twelve-day ECW training school for project leaders, unit supervisors and camp superintendents for all projects was paid out of regular Blister Rust Control funds of the St. Joe National Forest.

W-1232. Stream bottom area on Middle Fork of St. Maries River following the slashing and piling of the brush for burning. This area supported very heavy concentrations of R. inerme.



W-1232-1. The same area as above after burning.

TABLE NO. 1

STATEMENT OF GROSS EXPENDITURES OF NIRA OPERATION ST. JOE PROJECT

Item of Expenditure		Cost	
		Per Item	Total
Salaries and wages	Permanent men	$ 2,605.12	
	Temporary field men	48,774.56	$51,379.68
Subsistence	Wages, cooks and flunkies	4,410.94	
	Cost of food	11,651.22	
	Transportation of food	617.61	16,679.77
General Equipment	Cost	10,795.47	
	Repairs	30.96	
	Transportation	384.47	11,210.90
Miscellaneous	Supplies	6.04	
	Expenses	220.54	
	Rent Camp site	182.90	409.48
General Transportation	Trucks	3,970.40	
	Accessories and repairs	128.25	
	Gas and oil	241.85	4,340.50
	Grand Total		$84,020.33

The above table gives the gross expenditures for the NIRA St. Joe operation from July 1 to December 31, 1933. This table includes preeradication costs as well as Ribes eradication costs. The following adjustments have been made on table No. 2 in order to get the true Ribes eradication costs for the above period.

1. General equipment costs are prorated over a three-year period. All equipment was purchased new this year.

2. The cost of trucks is prorated on the basis of 30,000 miles as the average life.

3. Preeradication cost deductions were made as follows:

Wages, temporary field men..........	$4,133.18
Wages, cooks.......................	356.36
Cost of food.......................	577.20
Transportation costs...............	384.00
Equipment costs....................	30.00
Grand Total.......	$5,480.74

TABLE NO. 2

STATEMENT OF NET EXPENDITURES OF NIRA RIBES ERADICATION OPERATION
ST. JOE PROJECT

Item of Expenditure		Cost: Per Item	Cost: Total
Salaries and wages	Permanent men	$ 2,605.12	
	Temporary field men	44,641.38	$ 47,246.50
Subsistence	Wages, cooks and flunkies	4,054.58	
	Cost of food	10,272.56	
	Transportation of food	617.61	14,944.75
General equipment	Rental of equipment	3,713.39	
	Repairs	30.96	
	Transportation	382.47	4,126.82
Miscellaneous	Supplies	6.04	
	Expenses	220.54	
	Rent camp site	182.90	409.48
General transportation	Rent of trucks	176.64	
	Accessories and repairs	53.25	
	Gas and oil	116.85	346.74
Grand Total			$ 67,074.29

Statement of Meal Costs

Total cost of subsistence........................$14,944.75
Number of meals served..........56,740
Average cost meal served.........................$ .263

Statement of Composite Cost Per Effective Man Day

Net cost of operation............................$67,074.29
Total number of effective man days......11,235
Cost per effective man days...................... 5.97

Statement of Per Acre Preeradication Cost

Total cost preeradication........................$ 5,480.74
Total acres surveyed...........631,123
Average cost per acre............................ .009

RESULTS OF RIBES ERADICATION OPERATIONS

The results of Ribes eradication operations are presented in the following tables:

TABLE NO. 3

SUMMARY OF RIBES ERADICATION BY TYPES, ECW AND NIRA CAMPS
ST. JOE NATIONAL FOREST AND POTLATCH TIMBER PROTECTIVE ASSOCIATION, 1933

		Initial Eradication									First Mop-up									Total Eradication					
							Per Acre Basis									Per Acre Basis									
Name	Eradication Type	Acres	Effective Man Days	Total Ribes	Gallons Spray	Total Cost	Man Days	Ribes	Gallons Spray	Cost	Acres	Effective Man Days	Total Ribes	Gallons Spray	Total Cost	Man Days	Ribes	Gallons Spray	Cost	Acres Initial Eradi-cation	Acres First Mop-up	Total Effective Man Days	Total Ribes	Gallons Spray	Total Cost
ECW Camps	Open reproduction	16,009	18,018	7,146,220			1.13	446												16,009		18,018	7,146,220		
	Dense reproduction	12,150	4,296	421,647			.35	35												12,150		4,296	421,647		
	Open pole	7,630	3,212	513,576			.42	67												7,630		3,212	513,576		
	Dense pole	1,447	590	60,032			.41	41												1,447		590	60,032		
	Open mature	16,216	6,557	1,241,610			.40	77												16,216		6,557	1,241,610		
	Dense mature	5,264	1,264	212,327			.24	40												5,264		1,264	212,327		
	All upland	58,716	33,937	9,595,412			.58	163												58,716		33,937	9,595,412		
	Stream (hand)	5,793	15,072	3,072,870			2.60	530			1,824	2,541	461,297			1.39	253			5,793	1,824	17,613	3,534,167		
	Stream (chemical)	1,250	3,704		94,671		2.96		76		638	1,482		37,056		2.32		58		1,250	638	5,186		131,727	
	Stream (slash)	375	5,028				13.41													375		5,028			
	All stream	6,168	23,804	3,072,870			3.86				1,824	4,023	461,297			2.21				6,168	1,824	27,827	3,534,167		
	All types	64,884	57,741	12,668,282			.89	196*			1,824	4,023	461,297							64,884	1,824	61,764	13,129,579		
NIRA Camps	Open reproduction	4,686	4,972	1,575,972		$29,683.42	1.06	336		$ 6.33										4,686		4,972	1,575,972		$29,683.42
	Dense reproduction	2,297	1,191	182,826		7,110.43	.52	80		3.10										2,297		1,191	182,826		7,110.43
	Open pole	1,777	1,042	220,609		6,220.87	.59	124		3.50										1,777		1,042	220,609		6,220.87
	Dense pole	1,406	526	116,043		3,140.27	.37	83		2.23										1,406		526	116,043		3,140.27
	Open mature	249	354	130,456		2,113.42	1.42	524		8.49										249		354	130,456		2,113.42
	All upland	10,415	8,085	2,225,906		48,268.41	.78	214		4.63										10,415		8,085	2,225,906		48,268.41
	Stream (hand)	493	1,448	387,504		8,644.73	2.94	786		17.53	25	25	6,832		$ 149.25	1.00	273		$ 5.97	493	25	1,473	394,336		8,793.98
	Stream (slash)	109	1,397			8,340.27	12.82			76.52	24	280			1,671.63	11.67			69.65	109	24	1,677			10,011.90
	All stream	602	2,845	387,504		16,985.00	4.73			28.21	49	305	6,832		1,820.88	6.22				602	49	3,150	394,336		18,805.88
	All types	11,017	10,930	2,613,410		$65,253.41	.99	240*		$ 5.92	49	305	6,832		$1,820.88	6.22			$37.16	11,017	49	11,235	2,620,242		$67,074.29
ECW and NIRA Camps	Open reproduction	20,695	22,990	8,722,192			1.11	422												20,695		22,990	8,722,192		
	Dense reproduction	14,447	5,487	604,473			.38	42												14,447		5,487	604,473		
	Open pole	9,407	4,254	734,185			.45	78												9,407		4,254	734,185		
	Dense pole	2,853	1,116	176,075			.39	62												2,853		1,116	176,075		
	Open mature	16,465	6,911	1,372,066			.42	83												16,465		6,911	1,372,066		
	Dense mature	5,264	1,264	212,327			.24	40												5,264		1,264	212,327		
	All upland	69,131	42,022	11,821,318			.61	171												69,131		42,022	11,821,318		
	Stream (hand)	6,286	16,520	3,460,374			2.63	550			1,849	2,566	468,129			1.39	253			6,286	1,849	19,086	3,928,503		
	Stream (chemical)	1,250	3,704		94,671		2.96		76		638	1,482		37,056		2.32		58		1,250	638	5,186		131,727	
	Stream (slash)	484	6,425				13.27				24	280				11.67				484	24	6,705			
	All stream	6,770	26,649	3,460,374			3.94				1,873	4,328	468,129			2.31				6,770	1,873	30,977	3,928,503		
	All types	75,901	68,671	15,281,692			.90	203*			1,873	4,328	468,129			2.31				75,901	1,873	72,999	15,749,821		

*Stream slash acreage omitted in computation because no Ribes count taken.
Acres in stream type worked by both hand and chemical methods included only once in totals.

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TABLE NO. 4

INITIAL RIBES ERADICATION BY WORKING UNITS
ST. JOE NATIONAL FOREST, 1933

Working Unit Number	Eradication Type	Acres	Man Days	Number of Ribes Pulled: Ribes lacustre	Ribes viscosissimum	Ribes petiolare	Ribes inerme	Ribes irriguum	Total Ribes	Gallons Spray	Per Acre Basis: Man Days	Ribes	Gallons Spray
	Open reproduction	760	1,249	36,933	200,488	374		396	238,091		1.64	313	
	Dense reproduction	2,289	1,045	24,861	12,833	184		148	38,026		.46	17	
	Open pole	57	26	225	571				796		.46	14	
	Dense pole	204	189	4,188	1,998				6,186		.93	30	
	Open mature	2,812	995	33,241	86,812	497			120,550		.35	43	
32	Dense mature	1,362	145	13,215	5,994	110			19,319		.11	14	
	All upland	7,484	3,649	112,563	308,696	1,165		544	422,968		.49	57	
	Stream (hand)	474	664	87,656	2,313	815			90,784		1.40	192	
	Stream (chemical)	153	666							14,099	4.35		92
	All stream	474	1,330	87,656	2,313	815			90,784		2.80		
	All types	7,958	4,979	200,219	311,009	1,980		544	513,752		.63	65	
	Open reproduction	1,403	2,640	87,028	332,368	4,513	7,245		431,154		1.88	307	
	Dense reproduction	469	564	18,523	38,346	476	147		57,592		1.20	123	
	Open pole	49	83	5,593	2,911				8,504		1.69	174	
	Dense pole	527	84	2,242	13,193				15,435		.16	29	
	Open mature	466	723	10,528	205,114	7	1,436		217,085		1.55	466	
33	Dense mature	38	12	207					207		.32	5	
	All upland	2,952	4,106	124,221	591,332	4,996	8,828		729,977		1.39	247	
	Stream (hand)	227	460	39,665	705	32,601	31,728		104,699		2.03	461	
	Stream (chemical)	67	270							7,232	4.03		108
	Stream (slash)	62	1,021								16.50		
	All stream	289	1,751	39,665	705	32,601	31,728		104,699		6.06		
	All types	3,241	5,857	163,886	592,637	37,597	40,556		834,676		1.81	263 *	
	Open reproduction	3,534	2,930	222,636	366,765	4,280	9,088		602,769		.83	171	
	Dense reproduction	668	633	36,527	45,178	369	108		82,182		.95	123	
	Open pole	860	426	56,162	40,489	373	51		97,075		.50	113	
	Dense pole	524	229	17,999	56,526	28	6		74,559		.44	142	
	Open mature	145	135	6,139	38,213				44,352		.93	306	
34	All upland	5,731	4,353	339,463	547,171	5,050	9,253		900,937		.76	157	
	Stream (hand)	500	1,179	203,060	5,106	10,347	54,139		272,652		2.36	545	
	Stream (chemical)	150	695							23,051	4.63		154
	Stream (slash)	32	942								29.44		
	All stream	532	2,816	203,060	5,106	10,347	54,139		272,652		5.29		
	All types	6,263	7,169	542,523	552,277	15,397	63,392		1,173,589		1.14	188 *	
	Open reproduction	4,117	3,199	114,386	799,435	10,178	64,437		988,436		.78	240	
	Dense reproduction	2,536	966	31,603	95,112	3,719	10,923		141,357		.38	56	
	Open pole	2,648	1,004	51,617	131,488	10,431	14,017		207,553		.38	78	
	Dense pole	521	234	5,838	21,708	570	896		29,012		.45	56	
	Open mature	52	92	11,952	34,249	693	1,698		48,592		1.77	934	
35	All upland	9,874	5,495	215,396	1,081,992	25,591	91,971		1,414,950		.56	143	
	Stream (hand)	374	972	131,348	1,942	62,868	133,522		329,680		2.60	882	
	Stream (chemical)	39	170							4,573	4.36		117
	Stream (slash)	225	2,863								12.72		
	All stream	599	4,005	131,348	1,942	62,868	133,522		329,680		6.69		
	All types	10,473	9,500	346,744	1,083,934	88,459	225,493		1,744,630		.91	170 *	
	Open reproduction	1,353	558	26,694	20,762	592	2,791		50,839		.41	38	
	Dense reproduction	1,950	671	31,856	20,218	7,968	13,705	2	73,749		.34	38	
	Open pole	2,579	1,257	68,027	144,170	1,054	13,145		226,396		.49	88	
	Dense pole	6	24	1,708	8,338		12		10,058		4.00	1,676	
	Open mature	130	60	748	17,527		3,303		21,578		.46	166	
36	All upland	6,018	2,570	129,033	211,015	9,614	32,956	2	382,620		.43	64	
	Stream (hand)	547	1,808	183,292	2,998	18,822	70,262		275,374		3.31	503	
	Stream (chemical)	122	510							13,126	4.18		108
	All stream	547	2,318	183,292	2,998	18,822	70,262		275,374		4.24		
	All types	6,565	4,888	312,325	214,013	28,436	103,218	2	657,994		.74	100	
	Open reproduction	1,462	833	116,752	140,562		979		258,293		.57	177	
	Dense reproduction	1,506	308	71,112	42,435				113,547		.20	75	
	Open pole	1,066	491	51,868	70,233		2,095		124,196		.46	117	
	Dense pole	413	42	2,475	21,488				23,963		.10	58	
43	Open mature	2,560	863	111,286	113,463				224,749		.34	88	
	Dense mature	254	545	110,796	37,354				148,150		2.15	583	
	All upland	7,261	3,082	464,289	425,535		3,074		892,898		.42	123	
	Stream (hand)	575	1,607	335,699	11,414		47,044		394,157		2.79	686	
	All types	7,836	4,689	799,988	436,949		50,118		1,287,055		.60	164	
	Dense reproduction	3,128	393	11,844	14,065				25,909		.13	8	
	Open pole	148	Advance check										
	Open mature	850	829	117,085	20,114				137,199		.98	161	
44	All upland	4,126	1,222	128,929	34,179				163,108		.30	40	
	Stream (hand)	625	3,046	326,922	15,560		13,081		355,563		4.87	569	
	All types	4,751	4,268	455,851	49,739		13,081		518,671		.90	109	
	Open reproduction	2,432	1,232	37,698	61,811				99,509		.51	41	
	Dense reproduction	1,038	284	3,897	3,011				6,908		.27	7	
	Open pole	1,328	346	6,238	16,615				22,853		.26	17	
45	Dense pole	370	7	11	412				423		.02	1	
	Open mature	2,332	836	51,094	39,873		709		91,676		.36	39	
	All upland	7,500	2,705	98,938	121,722		709		221,369		.36	30	
	Stream (hand)	810	2,385	330,654	7,242		3,078		340,974		2.94	421	
	All types	8,310	5,090	429,592	128,964		3,787		562,343		.61	68	
	Open reproduction	15,061	12,641	643,027	1,922,191	19,937	84,540	396	2,669,091		.84	177	
	Dense reproduction	13,584	4,864	230,323	271,198	12,716	24,883	150	539,270		.36	40	
	Open pole	8,735	3,633	239,730	406,477	11,858	29,308		687,373		.42	79	
	Dense pole	2,565	809	34,461	123,663	598	914		159,636		.32	62	
	Open mature	9,347	4,533	342,073	555,365	1,197	7,146		905,781		.48	97	
All Units	Dense mature	1,654	702	124,218	43,348	110			167,676		.42	101	
	All upland	50,946	27,182	1,612,832	3,322,242	46,416	146,791	546	5,128,827		.53	101	
	Stream (hand)	4,132	12,121	1,638,296	47,280	125,453	352,854		2,163,883		2.93	524	
	Stream (chemical)	531	2,311							62,081	4.35		117
	Stream (slash)	319	4,826								15.13		
	All stream	4,451	19,258	1,639,296	47,280	125,453	352,854		2,163,883		4.33		
	All types	55,397	46,440	3,251,128	3,369,522	171,869	499,545	546	7,292,710		.84	132 *	

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Acres in stream type worked by both hand and chemical methods included only once in totals.
*Stream slash acreage omitted in computation because no Ribes count taken.

TABLE NO. 5

FIRST MOP-UP, RIBES ERADICATION BY WORKING UNITS
ST. JOE NATIONAL FOREST, 1933

Working Unit Number	Eradication Type	Acres	Man Days	Number of Ribes Pulled					Total Gallons	Per Acre		
				R. lacustre	R. visc.	R. petiolare	R. inerme	Total Ribes		Man Days	Ribes	Gallons
33	Stream (hand)	55	25	3,103	19	1,447	80	4,649		.45	85	
	Stream (chemical)	55	174						4,966	3.16		90
	All Stream	55	199	3,103	19	1,447	80	4,649		3.62		
35	Stream (hand)	344	396	100,527	64	9,461	52,112	162,164		1.15	471	
	Stream (chemical)	112	251						6,148	2.24		55
	Stream (slash)	24	280							11.67		
	All Stream	368	927	100,527	64	9,461	52,112	162,164		2.52		
All Units	Stream (hand)	399	421	103,630	83	10,908	52,192	166,813		1.06	418	
	Stream (chemical)	167	425						11,114	2.54		67
	Stream (slash)	24	280							11.67		
	All Stream	423	1,126	103,630	83	10,908	52,192	166,813		2.66		

Acres in stream type worked by both hand and chemical included only once in totals.

TABLE NO. 6

SUMMARY OF RIBES ERADICATION BY WORKING UNITS
ST. JOE NATIONAL FOREST, 1933

Working Unit Number	Eradication Type	Acres Initial Eradication	Acres First Mop-up	Man Days	Number of Ribes Pulled: Ribes lacustre	Ribes viscosissimum	Ribes petiolare	Ribes inerme	Ribes irriguum	Total Ribes	Gallons Spray
32	Open reproduction	760		1,249	36,833	200,488	374		396	238,091	
	Dense reproduction	2,289		1,045	24,861	12,833	184		148	38,026	
	Open pole	57		26	225	571				796	
	Dense pole	204		189	4,188	1,998				6,186	
	Open mature	2,812		995	33,241	86,812	497			120,550	
	Dense mature	1,362		145	13,215	5,994	110			19,319	
	All upland	7,484		3,649	112,563	308,696	1,165		544	422,968	
	Stream (hand)	474		664	87,656	2,313	815			90,784	
	Stream (chemical)	153		666							14,099
	All stream	474		1,330	87,656	2,313	815			90,784	
	All types	7,958		4,979	200,219	311,009	1,980		544	513,752	
33	Open reproduction	1,403		2,640	87,028	332,368	4,513	7,245		431,154	
	Dense reproduction	469		564	18,623	38,346	476	147		57,592	
	Open pole	49		83	5,593	2,911				8,504	
	Dense pole	527		84	2,242	13,193				15,435	
	Open mature	466		723	10,528	205,114	7	1,436		217,085	
	Dense mature	38		12	207					207	
	All upland	2,952		4,106	124,221	591,932	4,996	8,828		729,977	
	Stream (hand)	227	55	485	42,768	724	34,048	31,808		109,348	
	Stream (chemical)	67	55	444							12,198
	Stream (slash)	62		1,021							
	All stream	289	55	1,950	42,768	724	34,048	31,808		109,348	
	All types	3,241	55	6,056	166,989	592,656	39,044	40,636		839,325	
34	Open reproduction	3,534		2,930	222,636	366,765	4,280	9,088		602,769	
	Dense reproduction	668		633	36,527	45,178	369	108		82,182	
	Open pole	860		426	56,162	40,489	373	51		97,075	
	Dense pole	524		229	17,999	56,526	28	6		74,559	
	Open mature	145		135	6,139	38,213				44,352	
	All upland	5,731		4,353	339,463	547,171	5,050	9,253		900,937	
	Stream (hand)	500		1,179	203,060	5,106	10,347	54,139		272,652	
	Stream (chemical)	150		695							23,051
	Stream (slash)	32		942							
	All stream	532		2,816	203,060	5,106	10,347	54,139		272,652	
	All types	6,263		7,169	542,523	552,277	15,397	63,392		1,173,589	
35	Open reproduction	4,117		3,199	114,386	729,435	10,178	64,437		988,436	
	Dense reproduction	2,536		966	31,603	95,112	3,719	10,923		141,357	
	Open pole	2,648		1,004	51,617	131,488	10,431	14,017		207,553	
	Dense pole	521		234	5,838	21,708	570	896		29,012	
	Open mature	52		92	11,952	34,249	693	1,698		48,592	
	All upland	9,874		5,495	215,396	1,081,992	25,591	91,971		1,414,950	
	Stream (hand)	374	344	1,368	231,875	2,006	72,329	185,634		491,844	
	Stream (chemical)	39	112	421							10,721
	Stream (slash)	225	24	3,143							
	All stream	599	368	4,932	231,875	2,006	72,329	185,634		491,844	
	All types	10,473	368	10,427	447,271	1,083,998	97,920	277,605		1,906,794	
36	Open reproduction	1,353		558	26,694	20,762	592	2,791		50,839	
	Dense reproduction	1,950		671	31,856	20,218	7,968	13,705	2	73,749	
	Open pole	2,579		1,257	68,027	144,170	1,054	13,145		226,396	
	Dense pole	6		24	1,708	8,338		12		10,058	
	Open mature	130		60	748	17,527		3,303		21,578	
	All upland	6,018		2,570	129,033	211,015	9,614	32,956	2	382,620	
	Stream (hand)	547		1,808	183,292	2,998	18,822	70,262		275,374	
	Stream (chemical)	122		510							13,126
	All stream	547		2,318	183,292	2,998	18,822	70,262		275,374	
	All types	6,565		4,888	312,325	214,013	28,436	103,218	2	657,994	
43	Open reproduction	1,462		833	116,752	140,562		979		258,293	
	Dense reproduction	1,506		308	71,112	42,435				113,547	
	Open pole	1,066		491	51,868	70,233		2,095		124,196	
	Dense pole	413		42	2,475	21,488				23,963	
	Open mature	2,560		863	111,286	113,463				224,749	
	Dense mature	254		545	110,796	37,354				148,150	
	All upland	7,261		3,082	464,289	425,535		3,074		892,898	
	Stream (hand)	575		1,607	335,699	11,414		47,044		394,157	
	All types	7,836		4,689	799,988	436,949		50,118		1,287,055	
44	Dense reproduction	3.128		393	11,844	14,065				25,909	
	Open pole	148			Advance	Check					
	Open mature	850		829	117.085	20,114				137,199	
	All upland	4.126		1,222	128,929	34,179				163,108	
	Stream (hand)	625		3,046	326,922	15,560		13,081		355,563	
	All types	4,751		4,268	455.851	49,739		13,081		518,671	
45	Open reproduction	2,432		1,232	37,698	61,811				99,509	
	Dense reproduction	1,038		284	3,897	3,011				6,908	
	Open pole	1.328		346	6,238	16,615				22,853	
	Dense pole	370		7	11	412				423	
	Open mature	2,332		836	51,094	39.873		709		91,676	
	All upland	7.500		2,705	98,938	121,722		709		221,369	
	Stream (hand)	810		2.385	330,654	7,242		3,078		340,974	
	All types	8.310		5.090	429,592	128,964		3,787		562,343	
All Units	Open reproduction	15.061		12.641	642,027	1,922,191	19,937	84,540	396	2,669,091	
	Dense reproduction	13.584		4,864	230,323	271,198	12,716	24.883	150	539,270	
	Open pole	8.735		3,633	239,730	406,477	11,858	29,308		687,373	
	Dense pole	2,565		809	34,461	123,663	598	914		159,636	
	Open mature	9.347		4.533	342,073	555.365	1,197	7,146		905,781	
	Dense mature	1.654		702	124,218	43,348	110			167,676	
	All upland	50,946		27,182	1,612,832	3,322,242	46,416	146,791	546	5,128,827	
	Stream (hand)	4,132	399	12,542	1,741,926	47,363	136,361	405,046		2,330,696	
	Stream (chemical)	531	167	2,736							73,195
	Stream (slash)	319	24	5,106							
	All stream	4,451	423	20,384	1,741,926	47,363	136,361	405,046		2,330,696	
	All types	55,397	423	47,566	3,354,758	3,369,605	182,777	551,837	546	7,459,523	

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Acres in stream type worked by both hand and chemical methods included only once in totals.

TABLE NO. 7

INITIAL RIBES ERADICATION BY WORKING UNITS,
POTLATCH TIMBER PROTECTIVE ASSOCIATION, 1933

Working Unit Number	Eradication Type	Acres	Man Days	Number of Ribes Pulled: R. lacustre	R. viscosissimum	R. petiolare	R. inerme	Total Ribes	Gallons Spray	Per Acre: Man Days	Per Acre: Ribes	Per Acre: Gallons Spray
2	Open reproduction	1,017	1,372	35,761	129,629	457	455	166,302		1.35	164	
	Dense reproduction	763	514	21,321	1,706	31	1,624	24,682		0.67	32	
	Open pole	86	142	7,235	2,597		367	10,199		1.65	119	
	Dense pole	158	174	7,694	1,143	20	432	9,289		1.10	59	
	Open mature	252	164	5,130	18,225	15	248	23,618		0.65	94	
	All upland	2,276	2,366	77,141	153,300	523	3,126	234,090		1.04	103	
	Stream (hand)	337	1,139	129,585	212	4,203	30,735	164,735		3.38	489	
	Stream (chemical)	132	176						5,086	1.33		39
	All stream	337	1,315	129,585	212	4,203	30,735	164,735		3.90		
	All types	2,613	3,681	206,726	153,512	4,726	33,861	398,825		1.41	153	
3	Open reproduction	581	971	30,340	313,622	1,293	56	345,311		1.67	594	
	Dense reproduction	100	109	3,532	36,989			40,521		1.09	405	
	Open pole	148	59	686	1,456			2,142		0.40	14	
	Dense pole	130	133	1,950	5,200			7,150		1.02	55	
	Open mature	1,197	1,130	23,159	187,597	1,400		212,156		0.94	177	
	Dense mature	116	116	1,940	4,750			6,690		1.00	58	
	All upland	2,272	2,518	61,607	549,614	2,693	56	613,970		1.11	270	
	Stream (hand)	1,167	1,838	232,052	136,675	103,682	22,207	494,616		1.57	424	
	Stream (chemical)	297	637						10,913	2.14		37
	All stream	1,167	2,475	232,052	136,675	103,682	22,207	494,616		2.12		
	All types	3,439	4,993	293,659	686,289	106,375	22,263	1,108,586		1.45	322	
7	Open reproduction	2,440	2,164	73,026	757,867	6,699	9,064	846,656		0.89	347	
	Open mature	1,143	207	452	37,643	305		38,400		0.18	34	
	Dense mature	1,410	338	40	6,889			6,929		0.24	5	
	All upland	4,993	2,709	73,518	802,399	7,004	9,064	891,985		0.54	179	
8	Open reproduction	256	389	108,792	24,216	715		133,723		1.52	522	
	Open pole	438	420	16,746	16,526	1,199		34,471		0.96	79	
	Open mature	4,526	877	80,572	109,542	1,997		192,111		0.19	42	
	Dense mature	1,931	86	4,157	17,659	279		22,095		0.04	11	
	All upland	7,151	1,772	210,267	167,943	4,190		382,400		0.25	53	
	Stream (hand)	200	899	200,004	4,613	180,133	3,680	388,430		4.50	1,942	
	All types	7,351	2,671	410,271	172,556	184,323	3,680	770,830		.36	105	
9	Open reproduction	1,340	5,453	1,041,167	3,513,459	6,224	259	4,561,109		4.07	3,404	
	Dense mature	153	22	8,125	812			8,937		0.14	58	
	All upland	1,493	5,475	1,049,292	3,514,271	6,224	259	4,570,046		3.67	3,061	
	Stream (hand)	450	523	228,771	9,486	10,447	6	248,710		1.16	553	
	Stream (chemical)	290	580						16,591	2.00		57
	Stream (slash)	165	1,599							9.69		
	All stream	645	2,702	228,771	9,486	10,447	6	248,710		4.19		
	All types	2,108	8,177	1,278,063	3,523,757	16,671	265	4,818,756		3.88	*2,480	
All Units	Open reproduction	5,634	10,349	1,289,086	4,738,793	15,388	9,834	6,053,101		1.84	1,074	
	Dense reproduction	863	623	24,853	38,695	31	1,624	65,203		0.72	76	
	Open pole	672	621	24,667	20,579	1,199	367	46,812		0.92	70	
	Dense pole	288	307	9,644	6,343	20	432	16,439		1.07	57	
	Open mature	7,118	2,378	109,313	353,007	3,717	248	466,285		0.33	66	
	Dense mature	3,610	562	14,262	30,110	279		44,651		0.16	12	
	All upland	18,185	14,840	1,471,825	5,187,527	20,634	12,505	6,692,491		0.82	368	
	Stream (hand)	2,154	4,399	790,412	150,986	298,465	56,628	1,296,491		2.04	602	
	Stream (chemical)	719	1,393						32,590	1.94		45
	Stream (slash)	165	1,599							9.69		
	All stream	2,319	7,391	790,412	150,986	298,465	56,628	1,296,491		3.19		
	All types	20,504	22,231	2,262,237	5,338,513	319,099	69,133	7,988,982		1.08	* 393	

*Stream slash acreage omitted in computation because no Ribes count taken.
Acres in stream type worked by both hand and chemical methods included only once in totals.

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TABLE NO. 8

FIRST MOP-UP, RIBES ERADICATION BY WORKING UNITS
POTLATCH TIMBER PROTECTIVE ASSOCIATION, 1933

Working Unit Number	Eradication Type	Acres	Man Days	Number of Ribes Pulled: R. lacustre	R. viscosissimum	R. petiolare	R. inerme	Total Ribes	Total Gallons	Per Acre: Man Days	Ribes	Gallons
7	Stream (hand)	550	387	43,100	5,660	22,066	10,694	81,520		0.70	148	
	Stream (chemical)	131	169						2,198	1.29	-	17
	All Stream	550	556	43,100	5,660	22,066	10,694	81,520		1.01	-	
8	Stream (hand)	430	912	47,030	1,212	42,423	2,645	93,310		2.12	217	
	Stream (chemical)	154	436						13,062	2.83	-	85
	All Stream	430	1,348	47,030	1,212	42,423	2,645	93,310		3.13	-	
9	Stream (hand)	470	846	58,830	30,064	11,853	25,739	126,486		1.80	269	
	Stream (chemical)	186	452						10,682	2.43	-	57
	All Stream	470	1,298	58,830	30,064	11,853	25,739	126,486		2.76	-	
All Units	Stream (hand)	1,450	2,145	148,960	36,936	76,342	39,078	301,316		1.48	208	
	Stream (chemical)	471	1,057						25,942	2.24	-	55
	All Stream	1,450	3,202	148,960	36,936	76,342	39,078	301,316		2.21	-	

Acres in stream type worked by both hand and chemical included only once in totals.

TABLE NO. 9

SUMMARY OF RIBES ERADICATION BY WORKING UNITS
POTLATCH TIMBER PROTECTIVE ASSOCIATION, 1933

Working Unit Number	Eradication Type	Acres Initial Eradication	Acres First Mop-up	Man Days	Number of Ribes Pulled: R. lacustre	R. viscosissimum	R. petiolare	R. inerme	Total Ribes	Gallons Spray
2	Open reproduction	1,017		1,372	35,761	129,629	457	455	166,302	
	Dense reproduction	763		514	21,321	1,706	31	1,624	24,682	
	Open pole	86		142	7,235	2,597		367	10,199	
	Dense pole	158		174	7,694	1,143	20	432	9,289	
	Open mature	252		164	5,130	18,225	15	248	23,618	
	All upland	2,276		2,366	77,141	153,300	523	3,126	234,090	
	Stream (hand)	337		1,139	129,585	212	4,203	30,735	164,735	
	Stream (chemical)	132		176						5,086
	All stream	337		1,315	129,585	212	4,203	30,735	164,735	
	All types	2,613		3,681	206,726	153,512	4,726	33,861	398,825	
3	Open reproduction	581		971	30,340	313,622	1,293	56	345,311	
	Dense reproduction	100		109	3,532	36,989			40,521	
	Open pole	148		59	686	1,456			2,142	
	Dense pole	130		133	1,950	5,200			7,150	
	Open mature	1,197		1,130	23,159	187,597	1,400		212,156	
	Dense mature	116		116	1,940	4,750			6,690	
	All upland	2,272		2,518	61,607	549,614	2,693	56	613,970	
	Stream (hand)	1,167		1,838	232,052	136,675	103,682	22,207	494,616	
	Stream (chemical)	297		637						10,913
	All stream	1,167		2,475	232,052	136,675	103,682	22,207	494,616	
	All types	3,439		4,993	293,659	686,289	106,375	22,263	1,108,586	
7	Open reproduction	2,440		2,164	73,026	757,867	6,699	9,064	846,656	
	Open mature	1,143		207	452	37,643	305		38,400	
	Dense mature	1,410		338	40	6,889			6,929	
	All upland	4,993		2,709	73,518	802,399	7,004	9,064	891,985	
	Stream (hand)		550	387	43,100	5,660	22,066	10,694	81,520	
	Stream (chemical)		131	169						2,198
	All stream		550	556	43,100	5,660	22,066	10,694	81,520	
	All types	4,993	550	3,265	116,618	808,059	29,070	19,758	973,505	
8	Open reproduction	256		389	108,792	24,216	715		133,723	
	Open pole	438		420	16,746	16,526	1,199		34,471	
	Open mature	4,526		877	80,572	109,542	1,997		192,111	
	Dense mature	1,931		86	4,157	17,659	279		22,095	
	All upland	7,151		1,772	210,267	167,943	4,190		382,400	
	Stream (hand)	200	430	1,811	247,034	5,825	222,556	6,325	481,740	
	Stream (chemical)		154	436						13,062
	All stream	200	430	2,247	247,034	5,825	222,556	6,325	481,740	
	All types	7,351	430	4,019	457,301	173,768	226,746	6,325	864,140	
9	Open reproduction	1,340		5,453	1,041,167	3,513,459	6,224	259	4,561,109	
	Dense mature	153		22	8,125	812			8,937	
	All upland	1,493		5,475	1,049,292	3,514,271	6,224	259	4,570,046	
	Stream (hand)	450	470	1,369	287,601	39,550	22,300	25,745	375,196	
	Stream (chemical)	290	186	1,032						27,273
	Stream (slash)	165		1,599						
	All stream	615	470	4,000	287,601	39,550	22,300	25,745	375,196	
	All types	2,108	470	9,475	1,336,893	3,553,821	28,524	26,004	4,945,242	
All Units	Open reproduction	5,634		10,349	1,289,086	4,738,793	15,388	9,834	6,053,101	
	Dense reproduction	863		623	24,853	38,695	31	1,624	65,203	
	Open pole	672		621	24,667	20,579	1,199	367	46,812	
	Dense pole	288		307	9,644	6,343	20	432	16,439	
	Open mature	7,118		2,378	109,313	353,007	3,717	248	466,285	
	Dense mature	3,610		562	14,262	30,110	279		44,651	
	All upland	18,185		14,840	1,471,825	5,187,527	20,634	12,505	6,692,491	
	Stream (hand)	2,154	1,450	6,544	939,372	187,922	374,807	95,706	1,597,807	
	Stream (chemical)	719	471	2,450						58,532
	Stream (slash)	165		1,599						
	All stream	2,319	1,450	10,593	939,372	187,922	374,807	95,706	1,597,807	
	All types	20,504	1,450	25,433	2,411,197	5,375,449	395,441	108,211	8,290,298	

Acres in stream type worked by both hand and chemical methods included only once in totals.

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CHECKING RIBES ERADICATION WORK, 1933
ST. JOE NATIONAL FOREST AND
POTLATCH TIMBER PROTECTIVE ASSOCIATION

By
H. E. Swanson, Agent: W. F. Painter, Agent

The checking work was outlined to give the Ribes eradication forces immediate and detailed information on the amount and distribution of Ribes on the control areas both in advance of crews and following crew work to facilitate progress and to insure efficient work.

The organization consisted of a checking supervisor, 14 checker foremen and 42 checkers in the ECW camps. Checking on areas worked by NIRA crews was done in conjunction with checking on areas worked by ECW crews.

Seventy percent of the time of the checking personnel was spent on checking work and the remaining thirty percent was spent on activities directly connected with Ribes eradication work, which included such activities as training men, supervising crews in the field, reworking areas, and special assistance to the camp boss.

On the basis of advance checking on 27,233 acres, 17,768 acres were eliminated from crew work as being low in Ribes population.

The following tables are given showing the results of the checking work:

Table No. 1. Final Checking Report on Blister Rust Control Areas, NIRA Camps, St. Joe National Forest, 1933.

Table No. 2. Classification of Blister Rust Control Areas by Feet of Live Stem per Acre by Eradication Types Following Ribes Eradication, NIRA camps, St. Joe National Forest, 1933.

Table No. 3. Final Checking Report on Blister Rust Control Areas, ECW Camps, St. Joe National Forest and Potlatch Timber Protective Association, 1933.

Table No. 4. Classification of Blister Rust Control Areas by Feet of Live Stem per Acre by Eradication Types, Following Ribes Eradication, ECW Camps, St. Joe National Forest and Potlatch Timber Protective Association.

Note: Tables No. 2 and No. 4 represent a classification of the areas by 2.5 acre units on the basis of a four percent sample check.

TABLE NO. 1

FINAL CHECKING REPORT ON BLISTER RUST CONTROL AREAS, NIRA CAMPS
ST. JOE NATIONAL FOREST, 1933

Working Unit Number	Eradication Type	Number Acres Worked	Number Acres Checked	Percent Check	Worked Area Ribes per Acre							
					R.lacustre		R.viscosissimum		R.petiolare		All Species	
					Bu.	L.S.	Bu.	L.S.	Bu.	L.S.	Bu.	L.S.
33	O.R.	553	18.1	3.3	1	1	5	15			6	16
	D.P.	441	18.4	4.2	1	1	2	5			3	6
	O.M.	90	3.5	3.9	1	1	3	7			4	8
	All Upland	1,084	40.0	3.7	1	1	3	10			4	11
	Stream	73	8.5	11.6	4	10	1	3	1	1	6	14
	All Types	1,157	48.5	4.2	1	3	3	9	1	1	5	13
34	O.R.	1,617	67.0	4.1	1	7	2	9	1	1	4	17
	D.R.	140	4.7	3.4	2	8	1	3			3	11
	O.P.	189	12.7	6.7	1	1	2	9			3	10
	D.P.	444	10.4	2.3	1	2	1	7			2	9
	O.M.	145	6.0	4.1	1	5	2	11			3	16
	All Upland	2,535	100.8	4.0	1	5	2	9	1	1	4	15
	Stream	150	12.3	8.2	3	6	1	2			4	8
	All Types	2,685	113.1	4.2	1	5	2	8	1	1	4	14
35	O.R.	2,516	94.0	3.7	1	2	1	6	1	1	3	9
	D.R.	2,157	48.3	2.2	1	1	1	7			2	8
	O.P.	1,588	99.5	6.3	1	1	2	10			3	11
	D.P.	521	18.0	3.5	1	1	1	1			2	2
	O.M.	14	.6	4.3								
	All Upland	6,796	260.4	3.8	1	2	2	8	1	1	4	11
	Stream	295	28.3	9.6	2	5	1	1	1	1	4	7
	All Types	7,091	288.7	4.1	1	2	2	7	1	1	4	10
All Units	O.R.	4,686	179.1	3.8	1	4	2	8	1	1	4	13
	D.R.	2,297	53.0	2.3	1	1	1	6			2	7
	O.P.	1,777	112.2	6.3	1	1	2	9			3	10
	D.P.	1,406	46.8	3.3	1	1	1	4			2	5
	O.M.	249	10.1	4.1	1	3	2	9			3	12
	All Upland	10,415	401.2	3.9	1	2	1	8	1	1	3	11
	Stream	518	49.1	9.5	2	6	1	1	1	1	4	8
	All Types	10,933	450.3	4.1	1	3	2	7	1	1	4	11

Data secured on 4 percent sample check. Camps H2, H3, H4, H5 worked on Unit No. 35; camps H6 and H7 worked on Unit No. 34; camps H1 and H2 worked on Unit No. 33.

TABLE NO. 2

CLASSIFICATION OF BLISTER RUST CONTROL AREAS BY FEET OF LIVE STEM PER ACRE
BY ERADICATION TYPES, FOLLOWING RIBES ERADICATION, NIRA CAMPS
ST. JOE NATIONAL FOREST, 1933

Working Unit Number	Eradication Type	Acreage and Percentage of Acreage Worked by Eradication Crews Falling Within Each Feet of Live Stem Per Acre Class by Eradication Types														Total Acres
		0 Feet		1-25 Feet		26-50 Feet		51-100 Feet		101-150 Feet		151-300 Feet		301-500 Feet		
		Number Acres	Percent of Total	Number Acres	Percent of Total	Number Acres	Percent of Total	Number Acres	Percent of Total	Number Acres	Percent of Total	Number Acres	Percent of Total	Number Acres	Percent of Total	
33	Open reproduction	400.5	72.4	45.0	8.1	65.0	11.8	25.0	4.5	12.5	2.2	5.0	1.0			553
	Dense pole	401.0	90.9	7.5	1.7	25.0	5.7	7.5	1.7							441
	Open mature	72.5	80.5	15.0	16.7	2.5	2.8									90
	All upland	874.0	80.6	67.5	6.2	92.5	8.5	32.5	3.0	12.5	1.2	5.0	.5			1,084
	Stream			73.0	100.0											73
	All types	874.0	75.5	140.5	12.2	92.5	8.0	32.5	2.8	12.5	1.1	5.0	.4			1,157
34	Open reproduction	1,329.5	82.2	77.5	4.8	110.0	6.8	42.5	2.6	22.5	1.4	25.0	1.6	10.0	.6	1,617
	Dense reproduction	125.0	89.2			7.5	5.4	7.5	5.4							140
	Open pole	146.5	77.5	2.5	1.3	22.5	11.9	7.5	4.0	2.5	1.3	5.0	2.7	2.5	1.3	189
	Dense pole	429.0	96.6			5.0	1.1	7.5	1.7	2.5	.6					444
	Open mature	117.5	81.0					17.5	12.2	5.0	3.4	5.0	3.4			145
	All upland	2,147.5	84.6	80.0	3.2	145.0	5.7	82.5	3.3	32.5	1.3	35.0	1.4	12.5	.5	2,535
	Stream			150.0	100.0											150
	All types	2,147.5	80.0	230.0	8.5	145.0	5.4	82.5	3.1	32.5	1.2	35.0	1.3	12.5	.5	2,685
35	Open reproduction	2,216.0	88.1	92.5	3.7	87.5	3.4	77.5	3.1	20.0	.8	22.5	.9			2,516
	Dense reproduction	1,994.5	92.5	32.5	1.5	62.5	2.9	37.5	1.7	17.5	.8	12.5	.6			2,157
	Open pole	1,113.0	70.1	110.0	6.9	207.5	13.1	100.0	6.2	30.0	1.9	25.0	1.6	2.5	.2	1,588
	Dense pole	506.0	97.1	10.0	1.9	5.0	1.0									521
	Open mature	14.0	100.0													14
	All upland	5,843.5	86.0	245.0	3.6	362.5	5.3	215.0	3.1	67.5	1.0	60.0	.9	2.5	.1	6,796
	Stream			295.0	100.0											295
	All types	5,843.5	82.4	540.0	7.6	362.5	5.1	215.0	3.0	67.5	1.0	60.0	.8	2.5	.1	7,091
All Units	Open reproduction	3,946.0	84.2	215.0	4.6	262.5	5.6	145.0	3.1	55.0	1.2	52.5	1.1	10.0	.2	4,686
	Dense reproduction	2,119.5	92.3	32.5	1.4	70.0	3.0	45.0	2.0	17.5	.8	12.5	.5			2,297
	Open pole	1,259.5	70.9	112.5	6.3	230.0	12.9	107.5	6.1	32.5	1.8	30.0	1.7	5.0	.3	1,777
	Dense pole	1,336.0	95.0	17.5	1.2	35.0	2.5	15.0	1.1	2.5	.2					1,406
	Open mature	204.0	81.9	15.0	6.0	2.5	1.0	17.5	7.1	5.0	2.0	5.0	2.0			249
	All upland	8,865.0	85.1	392.5	3.8	600.0	5.7	330.0	3.2	112.5	1.1	100.0	1.0	15.0	.1	10,415
	Stream			518.0	100.0											518
	All types	8,865.0	81.1	910.5	8.3	600.0	5.5	330.0	3.0	112.5	1.1	100.0	.9	15.0	.1	10,933

Data secured on 4 percent sample check.

Annual Report, 1933
W. F. Painter

Camps H1 and H2 worked on Unit #33.
Camps H6 and H7 worked on Unit #34.
Camps H2, H3, H4 and H5 worked on Unit #35.

TABLE NO. 8

FINAL CHECKING REPORT ON BLISTER RUST CONTROL AREAS, ECW CAMPS
ST. JOE NATIONAL FOREST AND POTLATCH TIMBER PROTECTIVE ASSOCIATION, 1933

Working Unit Number	Eradication Type	Worked Area: Number Acres Worked	Worked Area: Number Acres Checked	Worked Area: Per-cent Check	Advance Check Area: Number Acres In Area	Advance Check Area: Number Acres Eliminated From Crew Work	Advance Check Area: Number of Acres Checked	Advance Check Area: Per-cent Check	Total Acres Reported	Worked Area, Ribes per Acre: R. lacustre Bushes	R. lacustre Live Stem	R. viscosissimum Bushes	R. viscosissimum Live Stem	R. petiolare Bushes	R. petiolare Live Stem	R. inerme Bushes	R. inerme Live Stem	All Species Bushes	All Species Live Stem	Seedlings	Acres Eliminated on Basis of Advance Check, Ribes per Acre: R. lacustre Bushes	R. lacustre Live Stem	R. viscosissimum Bushes	R. viscosissimum Live Stem	All Species Bushes	All Species Live Stem
2 (Camp F-208)	Open reproduction	1,017	40.9	4.0					1,017	1	4	2	9			2	6	5	13							
	Dense reproduction	763	32.6	4.3					763	2	7	1	2			1	1	4	10							
	Open pole	66	4.9	3.6					66	2	17	1	1					3	18							
	Dense pole	156	6.9	4.4					156	2	6							2	6							
	Open mature	252	10.4	4.1					252	1	5	1	1					2	6							
	All upland	2,276	95.6	4.2					2,276	1	6	1	4			1	3	2	13							
	Stream	214	19.6	9.2					214	3	10			1	1	2	5	6	16							
	All types	2,490	115.4	4.6					2,490	2	7	1	4	1	1	1	3	5	15							
3 (Camp S-210)	Open reproduction	418	16.6	4.0		163	6.5	4.0	581	1	2	2	6					4	10		1	5	2	15	3	20
	Dense reproduction	54	2.2	4.1		46	2.0	4.3	100	1	13	1	14					2	26				2	22	2	22
	Open pole	18	.8	4.4		130	5.1	3.9	148	2	19	25	87					27	106		1	1	1	7	2	8
	Dense pole	114	4.9	4.3		16	.8	5.0	130	1	82	1	17					2	99		1	10	11	22	12	32
	Open mature	1,028	41.4	4.0		169	6.0	3.5	1,197	1	16	6	41					7	57		1	8	1	15	2	25
	Dense mature	116	4.7	4.0					116	3	47	3	41					6	88							
	All upland	1,748	70.6	4.0	1,355	524	20.4	3.9	2,272	1	19	5	31					6	50		1	4	2	14	3	18
	Stream	1,167	70.4	6.0					1,167	2	16	2	5	1	9	1	2	6	32							
	All types	2,915	141.0	4.8	1,355	524	20.4	3.9	3,439	2	17	3	18	1	8	1	1	7	41		1	4	2	14	3	18
7 (Camp F-211)	Open reproduction	2,440	100.6	4.1					2,440	1	2	1	6					2	8							
	Open mature	627	30.5	4.9		516	29.0	5.6	1,143	1	7	2	7					2	14		1	13	4	34	5	47
	Dense mature	294	10.3	3.5		1,116	47.6	4.3	1,410	11	67	10	58					21	125		1	2	4	38	5	40
	All upland	3,361	141.7	4.2	2,678	1,632	76.6	4.7	4,993	1	8	2	10					3	18		1	6	4	27	5	43
	Stream	550	66.7	12.1					550	3	9	1	1	1	5	1	3	5	18							
	All types	3,911	208.4	5.3	2,678	1,632	76.6	4.6	5,543	2	8	1	7	1	1	1	1	6	17		1	6	4	27	5	43
8 (Camp F-209)	Open reproduction	256	10.8	4.2					256	13	52	5	23	1	4			18	79							
	Open pole	438	17.3	3.9					438	2	8	1	7					3	15							
	Open mature	3,372	133.0	3.9		1,153	49.0	4.2	4,525	2	17	2	27					4	44		6	123	1	11	7	134
	Dense mature	1,489	59.0	4.0		442	17.6	4.0	1,931	1	6	1	2	1	2			3	10		1	1	1	6	2	7
	All upland	5,555	220.1	4.0	2,150	1,596	65.6	4.1	7,151	2	15	1	19	1	1			4	35		4	90	1	10	5	100
	Stream	530	51.9	9.8					530	5	34			1	7			6	41							
	All types	6,085	272.0	4.5	2,150	1,596	65.6	4.1	7,681	3	19	1	15	1	2			5	36		4	90	1	10	5	100
9 (Camps S-213 F-47)	Open reproduction	1,240	53.1	4.0					1,240	7	22	14	31	1	1			22	54							
	Dense mature					153	7.7	5.0	153												1	1			1	1
	All upland	1,240	53.1	4.0	153	153	7.7	5.0	1,393	7	22	14	31	1	1			22	54		1	1			1	1
	Stream	690	62.5	9.0					690	7	25	1	2	1	9			9	36							
	All types	2,030	115.6	5.7	153	153	7.7	5.0	2,183	7	23	7	15	1	6			16	44		1	1			1	1
32 (Camp F-46)	Open reproduction	760	29.7	3.9					760	1	7	6	40					7	47							
	Dense reproduction	2,289	107.7	4.7					2,289	1	6	1	3					2	9							
	Open pole	57	6.4	11.2					57	1	4	1	1					2	5							
	Dense pole	204	7.3	3.6					204	1	3	1	1					2	4							
	Open mature	2,812	89.5	3.2					2,812	2	13	1	5					3	18							
	Dense mature	1,362	57.3	4.2					1,362	1	4	1	1					2	5							
	All upland	7,484	298.4	4.0					7,484	1	8	1	7					2	15							
	Stream	474	53.4	11.3					474	2	20	1	1	1	5			3	26							
	All types	7,958	351.8	4.4					7,958	2	10	1	6	1	1			4	17							
33 (Camp F-45)	Open reproduction	850	34.2	4.0					850	3	9	2	6			1	1	6	16							
	Dense reproduction	397	15.8	4.0		72	3.5	4.9	469	1	1	1	5			1	1	3	7		1	2			1	2
	Open pole	49	2.0	4.1					49	13	26	3	10					16	36							
	Dense pole					86	3.6	4.2	86												1	7	1	11	2	18
	Open mature	376	14.5	3.8					376	1	1	9	31					10	32							
	Dense mature	38	1.6	4.2					38	1	2	7	12					8	14							
	All upland	1,710	68.2	4.0	617	158	7.1	4.5	1,868	2	6	4	10			1	1	7	17		1	4	1	5	2	9
	Stream	78	3.4	4.2					78	2	4			1	1			3	5							
	All types	1,788	71.6	4.0	617	158	7.1	4.5	1,946	2	6	3	9	1	1	1	1	7	17		1	4	1	5	2	9
34 (Camp F-43)	Open reproduction	1,587	64.1	4.0		330	13.0	4.1	1,917	4	15	1	1	1	1			6	17		1	7			1	7
	Dense reproduction	394	15.7	4.0		134	5.4	4.0	528	3	11	1	4					4	15		1	1			1	1
	Open pole	501	20.2	4.0		170	6.2	3.7	671	6	38	4	36					10	74		1	2	6	42	7	44
	Dense pole					60	2.1	3.5	60														6	25	6	25
	All upland	2,492	100.0	4.0	1,002	704	27.5	3.9	3,196	4	19	1	9	1	1			6	29		1	4	2	12	3	16
	Stream	225	24.5	10.9					225	6	13			1	4	1	2	8	19							
	All types	2,717	124.5	4.6	1,002	704	27.5	3.9	3,421	4	16	1	7	1	1	1	1	7	27		1	4	2	12	3	16
35 (Camp F-44)	Open reproduction	1,307	52.3	4.0		294	11.4	3.9	1,601	1	4	1	8					2	12		1	2	1	7	2	9
	Dense reproduction	173	6.9	4.0		206	8.2	4.0	379	1	3	3	12					4	15		1	1	1	2	2	3
	Open pole	265	10.4	3.9		795	31.9	4.0	1,060	1	4	3	13					4	17		1	1	2	17	3	18
	Open mature	38	1.5	3.9					38			11	29					11	29							
	All upland	1,782	71.1	4.0	5,095	1,295	51.4	4.0	3,078	1	4	2	10					2	14		1	1	2	12	3	13
	Stream	272	22.9	8.4					272	6	14	1	1	1	2	1	2	8	19							
	All types	2,054	94.0	4.6	5,095	1,295	51.4	4.0	3,350	2	6	1	7	1	1	1	1	3	15		1	1	2	12	3	13
36 (Camp F-42)	Open reproduction	913	36.0	3.9		440	17.4	4.0	1,353	1	6	1	3	1	1			2	10		3	23	5	27	8	50
	Dense reproduction	860	34.3	4.0		1,090	43.2	4.0	1,950	1	1	1	4	1	1	1	1	4	7		2	17	1	2	3	19
	Open pole	2,442	97.4	4.0		137	6.3	4.6	2,579	1	5	1	10			1	1	3	17		1	1			1	1
	Dense pole	6	.3	5.0					6																	
	Open mature	130	5.7	4.4					130	1	5							1	5							
	All upland	4,351	173.7	3.9	2,486	1,667	67.0	4.0	6,018	1	5	1	7	1	1	1	1	4	14		2	16	1	11	3	29
	Stream	547	33.8	6.2					547	4	52	1	1	1	7	1	2	7	62							
	All types	4,898	207.5	4.2	2,486	1,667	67.0	4.0	6,565	2	12	1	5	1	1	1	1	5	21		2	16	1	11	3	29
43 (Camp F-40)	Open reproduction	1,090	43.3	4.0		372	14.3	3.8	1,462	5	17	3	20					8	27	3	2	11	4	15	6	26
	Dense reproduction	927	37.4	4.0		569	22.8	4.0	1,506	5	32	4	31			1	1	10	64		1	12	1	1	2	13
	Open pole	892	25.3	4.0		172	6.2	3.6	1,064	3	19	4	34			1	1	5	54		1	2	5	54	6	56
	Dense pole	105	4.5	4.3		308	12.6	4.1	413	1	1	1	6					2	7		1	1	1	15	2	16
	Open mature	1,879	75.7	4.0		681	27.4	4.0	2,560	4	29	3	28					7	57		1	12	2	20	3	32
	Dense mature	123	4.9	4.0		131	5.3	4.0	254	3	8							3	8							
	All upland	5,027	201.7	4.0	4,025	2,234	89.7	4.0	7,261	4	24	2	25			1	1	8	51	1	1	9	2	15	3	24
	Stream	575	41.2	7.2					575	9	38	1	1			1	1	11	30	1						
	All types	5,602	242.9	4.3	4,025	2,234	89.7	3.9	7,836	5	26	2	22			1	1	9	48	1	1	9	2	15	3	24
44 (Camp F-41)	Dense reproduction	339	21.3	6.3		2,789	125.5	4.5	3,128	1	7	4	33					5	39		2	26	2	19	4	45
	Open pole					148	8.4	5.7	148												1	8	24	105	25	112
	Open mature	466	19.8	4.2		384	16.4	4.3	850	6	65	1	13					7	78		4	41	1	6	5	47
	All upland	805	41.7	5.2	3,539	3,321	150.6	4.5	4,126	3	34	3	22					6	57		3	27	3	22	6	49
	Stream	625	56.5	9.1					625	6	16	1	1					7	17							
	All types	1,430	98.5	6.9	3,539	3,321	150.6	4.5	4,751	6	24	1	10					6	34		3	27	3	22	6	49
45 (Camp F-39)	Open reproduction	1,263	50.5	4.0		1,163	46.4	4.0	2,426	2	14	3	19					5	33		1	5	1	5	2	10
	Dense reproduction	542	21.7	4.0		496	19.8	4.0	1,038	1	8	1	2					2	10		1	2	1	4	2	6
	Open pole	951	38.6	4.1		377	15.2	4.0	1,328	1	13	2	13					3	26		1	9	1	6	2	15
	Dense pole	37	1.3	3.5		333	13.5	4.1	370	1	5							1	5		1	1			1	1
	Open mature	1,212	48.9	4.0		1,110	44.5	4.0	2,322	2	16	1	10					3	26		2	17	1	6	3	23
	All upland	4,016	161.3	4.0	3,533	3,484	139.5	4.0	7,500	1	14	2	13					3	27		1	6	1	3	2	12
	Stream	810	62.8	7.7					810	5	22	1	1					6	24							
	All types	4,826	224.1	4.6	3,533	3,484	139.5	4.0	8,310	2	16	1	9					4	26		1	6	1	3	2	13

Working Units Nos. 2, 3, 7, 8 and 9 are on the Potlatch Timber Protective Association; the remaining working units are on the St. Joe National Forest.
Data secured on 4 percent sample check.

Annual Report 1933
W. F. Painter

TABLE NO. 4

CLASSIFICATION OF BLISTER RUST CONTROL AREAS BY FEET OF LIVE STEM PER ACRE BY ERADICATION TYPES FOLLOWING RIBES ERADICATION. NEW CAMPS
ST. JOE NATIONAL FOREST AND POTLATCH TIMBER PROTECTIVE ASSOCIATION, 1933

Acreage and Percentage of Acreage Worked by Eradication Crews Falling Within Each Feet of Live Stem Per Acre Class by Eradication Types

Working Unit Number	Eradication Type	0 Feet Number Acres	0 Feet Percent of Total	1-25 Feet Number Acres	1-25 Feet Percent of Total	26-50 Feet Number Acres	26-50 Feet Percent of Total	51-100 Feet Number Acres	51-100 Feet Percent of Total	101-150 Feet Number Acres	101-150 Feet Percent of Total	151-300 Feet Number Acres	151-300 Feet Percent of Total	301-500 Feet Number Acres	301-500 Feet Percent of Total	501-1000 Feet Number Acres	501-1000 Feet Percent of Total	1001 Feet and Over Number Acres	1001 Feet and Over Percent of Total	Total Acres
2 (Camp P-208)	Open reproduction	[illegible]	68.8	[illegible]	[illegible]	125.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			[illegible]
	Dense reproduction	[illegible]	88.9	[illegible]	[illegible]	20.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]							[illegible]
	Open pole	[illegible]	79.7	[illegible]	[illegible]	5.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					[illegible]
	Dense pole	[illegible]	87.3	[illegible]	[illegible]	12.5	[illegible]	[illegible]	[illegible]											[illegible]
	Open mature	227.0	90.1	[illegible]	[illegible]	15.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]									[illegible]
	All upland	[illegible]	79.7	[illegible]	[illegible]	177.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			[illegible]
	Stream			214.0	100.0															[illegible]
	All types	[illegible]	[illegible]	[illegible]	[illegible]	177.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	5.0	[illegible]	2.5	[illegible]			[illegible]
3 (Camp S-310)	Open reproduction	[illegible]	[illegible]	[illegible]	[illegible]	22.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.4							[illegible]
	Dense reproduction	[illegible]	[illegible]			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	9.2									[illegible]
	Open pole	[illegible]	[illegible]									[illegible]	[illegible]							[illegible]
	Dense pole	114.0	100.0																	[illegible]
	Open mature	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.9	[illegible]	.7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.0	[illegible]
	Dense mature	111.0	[illegible]							[illegible]	2.1					[illegible]	[illegible]			[illegible]
	All upland	[illegible]	81.1	[illegible]	.6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3.0	[illegible]	2.3	[illegible]	1.3	[illegible]	.9	10.0	.5	[illegible]
	Stream					[illegible]	100.0													[illegible]
	All types	1,418.0	[illegible]	[illegible]	2.7	[illegible]	42.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.8	[illegible]	[illegible]	10.0	.3	[illegible]
7 (Camp P-211)	Open reproduction	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.7	[illegible]	[illegible]			[illegible]	.1	[illegible]
	Open mature	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.0							[illegible]
	Dense mature	[illegible]	[illegible]					[illegible]	[illegible]	[illegible]	.9	5.0	1.6							[illegible]
	All upland	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.0	[illegible]	[illegible]			[illegible]	.1	[illegible]
	Stream			[illegible]	100.0															[illegible]
	All types	[illegible]	77.4	[illegible]	15.0	[illegible]	[illegible]	[illegible]	2.7	[illegible]	[illegible]	[illegible]	.9	[illegible]	.2			2.5	.1	[illegible]
8 (Camp P-209)	Open reproduction	[illegible]	44.4	17.5	6.6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4.8	[illegible]	3.9	5.0	2.0	2.5	1.0	[illegible]
	Open pole	[illegible]	66.4	[illegible]	4.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.1					[illegible]
	Open mature	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.4	[illegible]	1.8	[illegible]	.9	22.5	.7	[illegible]
	Dense mature	[illegible]	[illegible]	[illegible]	.2	[illegible]	.5	[illegible]	.7	7.5	.5	[illegible]	1.0			5.0	[illegible]			[illegible]
	All upland	[illegible]	86.1	[illegible]	1.4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.2	[illegible]	[illegible]	75.0	1.4	27.5	.7	[illegible]	.4	[illegible]
	Stream					[illegible]	100.0													[illegible]
	All types	4,892.5	80.4	[illegible]	[illegible]	[illegible]	[illegible]	102.5	1.7	[illegible]	1.1	[illegible]	2.0	[illegible]	1.2	[illegible]	.6	25.0	.4	[illegible]
9 (Camps S-213 F-47)	Open reproduction	547.5	40.9	[illegible]	16.6	[illegible]	14.0	[illegible]	11.7	100.0	[illegible]	[illegible]	[illegible]	20.0	2.2	10.0	.7	2.5	.2	[illegible]
	Dense mature																			
	All upland	547.5	40.9	[illegible]	[illegible]	[illegible]	14.0	[illegible]	11.7	100.0	[illegible]	[illegible]	[illegible]	30.0	[illegible]	10.0	[illegible]	2.5	.2	[illegible]
	Stream					[illegible]	[illegible]													[illegible]
	All types	547.5	27.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.5	[illegible]	.5	2.5	.1	[illegible]
32 (Camp F-46)	Open reproduction	555.0	73.1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.3	5.0	.7	[illegible]
	Dense reproduction	2,054.0	89.8	[illegible]	1.1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.2	[illegible]	.2	5.0	.2			[illegible]
	Open pole	47.0	82.4	[illegible]	4.4			[illegible]	[illegible]	[illegible]	4.4									[illegible]
	Dense pole	191.5	93.9			[illegible]	[illegible]	[illegible]	1.2			[illegible]	1.2							[illegible]
	Open mature	2,512.0	89.3	[illegible]	1.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	17.5	.6	5.0	.2	2.5	.1	[illegible]
	Dense mature	1,282.0	94.1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			5.0	.4			[illegible]
	All upland	6,641.5	88.8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.5	25.0	.3	7.5	.1	[illegible]
	Stream					[illegible]	100.0													[illegible]
	All types	6,641.5	83.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.6	[illegible]	.4	25.0	.3	7.5	.1	[illegible]
33 (Camp F-45)	Open reproduction	560.0	65.9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.2	2.5	.3	2.5	.3			[illegible]
	Dense reproduction	372.0	93.7	[illegible]	[illegible]	[illegible]	[illegible]			[illegible]	[illegible]									[illegible]
	Open pole	21.5	43.9	5.0	[illegible]	[illegible]	[illegible]	[illegible]	20.4	[illegible]	[illegible]	[illegible]	10.2							[illegible]
	Dense pole																			
	Open mature	198.5	52.8	[illegible]	[illegible]	[illegible]	19.9	[illegible]	[illegible]	[illegible]	[illegible]			2.5	.7					[illegible]
	Dense mature	20.5	53.9	[illegible]	[illegible]	[illegible]	6.6	[illegible]	[illegible]											[illegible]
	All upland	1,172.5	68.6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	5.7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.3	2.5	.1			[illegible]
	Stream			[illegible]	100.0															[illegible]
	All types	1,172.5	65.7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.8	[illegible]	.2	2.5	.1			[illegible]
34 (Camp F-43)	Open reproduction	1,247.0	78.1	[illegible]	[illegible]	100.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.3	2.5	.2	2.5	.2			[illegible]
	Dense reproduction	329.0	83.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.9	[illegible]	1.3					[illegible]
	Open pole	348.5	69.5	[illegible]	3.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	40.0	8.0	10.0	2.0	12.5	2.5	2.5	.5	[illegible]
	Dense pole																			
	All upland	1,924.5	77.3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	17.5	.7	15.0	.6	2.5	.1	[illegible]
	Stream			[illegible]	100.0															[illegible]
	All types	1,924.5	70.8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.7	[illegible]	[illegible]	17.5	.6	15.0	.6	2.5	.1	[illegible]
35 (Camp F-44)	Open reproduction	1,032.0	79.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.5	[illegible]	[illegible]	10.0	.7	2.5	.2			[illegible]
	Dense reproduction	140.5	81.2	7.5	4.4	10.0	[illegible]	7.5	[illegible]			[illegible]	[illegible]							[illegible]
	Open pole	192.5	72.6	[illegible]	[illegible]	27.5	14.2	[illegible]	[illegible]	[illegible]	1.5									[illegible]
	Open mature	[illegible]	[illegible]	7.5	19.7	[illegible]	[illegible]	[illegible]	[illegible]											[illegible]
	All upland	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7.4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10.0	.6	2.5	.1			[illegible]
	Stream			[illegible]	100.0															[illegible]
	All types	[illegible]	67.7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10.0	.5	2.5	.1			[illegible]
36 (Camp F-42)	Open reproduction	[illegible]	61.9	[illegible]	[illegible]	[illegible]	4.1	[illegible]	[illegible]	[illegible]	1.4	[illegible]	[illegible]	10.0	1.1	7.5	.8	2.5	.3	[illegible]
	Dense reproduction	[illegible]	[illegible]	[illegible]	4.7	[illegible]	[illegible]	15.0	1.7	[illegible]	.5	[illegible]	.3	[illegible]	.6					[illegible]
	Open pole	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	47.5	2.0	27.5	1.1	[illegible]	1.1	[illegible]	1.3	20.0	.8			[illegible]
	Dense pole	[illegible]	100.0																	[illegible]
	Open mature	[illegible]	100.0																	[illegible]
	All upland	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.1	[illegible]	[illegible]	47.5	1.1	27.5	.6	2.5	.1	[illegible]
	Stream							[illegible]	100.0											[illegible]
	All types	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.2	47.5	1.0	[illegible]	.6	[illegible]	.1	[illegible]
43 (Camp F-40)	Open reproduction	[illegible]	[illegible]	[illegible]	4.6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3.5	7.5	.7	[illegible]	.9	[illegible]	1.1	[illegible]
	Dense reproduction	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.1	[illegible]
	Open pole	[illegible]	[illegible]	5.0	.4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.0	[illegible]	[illegible]	[illegible]	[illegible]	10.0	1.1	7.5	.8	[illegible]
	Dense pole	[illegible]	[illegible]			[illegible]	2.4													[illegible]
	Open mature	[illegible]	[illegible]	[illegible]	[illegible]	57.5	2.1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4.2	[illegible]	3.1	[illegible]	2.1	7.5	.4	[illegible]
	Dense mature	[illegible]	[illegible]	[illegible]	4.1	[illegible]	2.0	[illegible]	2.0	[illegible]	2.0	[illegible]	[illegible]	[illegible]	2.0					[illegible]
	All upland	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.7	[illegible]	[illegible]	[illegible]	2.7	[illegible]	4.6	[illegible]	2.5	[illegible]	[illegible]	[illegible]	.8	[illegible]
	Stream					375.0	100.0													[illegible]
	All types	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.4	[illegible]	4.2	[illegible]	2.3	[illegible]	1.6	[illegible]	.7	[illegible]
44 (Camp F-41)	Dense reproduction	[illegible]	[illegible]	[illegible]	11.1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.5	[illegible]	5.9	2.5	.7	[illegible]
	Open pole																			
	Open mature	[illegible]	[illegible]	5.0	1.1	17.5	[illegible]	[illegible]	[illegible]	[illegible]	2.7	[illegible]	10.2	7.5	1.6	[illegible]	[illegible]	5.0	1.0	[illegible]
	All upland	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7.5	[illegible]	[illegible]	[illegible]	2.7	[illegible]	9.3	[illegible]	1.6	[illegible]	3.7	7.5	.9	[illegible]
	Stream			[illegible]	100.0															[illegible]
	All types	[illegible]	[illegible]	[illegible]	46.7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	7.5	.5	[illegible]
45 (Camp F-39)	Open reproduction	[illegible]	[illegible]	17.5	1.4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.6	7.5	.6	2.5	[illegible]	[illegible]
	Dense reproduction	[illegible]	[illegible]			[illegible]	.5	5.0	[illegible]	[illegible]	[illegible]	[illegible]	.5							[illegible]
	Open pole	[illegible]	86.1	15.0	1.4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.1	7.5	.8			2.5	[illegible]	[illegible]
	Dense pole	[illegible]	100.0																	[illegible]
	Open mature	[illegible]	[illegible]	[illegible]	1.1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.2	[illegible]	1.6	[illegible]	1.2	12.5	1.0	2.5	[illegible]	[illegible]
	All upland	[illegible]	[illegible]	[illegible]	1.1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.7	[illegible]	.8	20.0	.5	7.5	[illegible]	[illegible]
	Stream			[illegible]	100.0															[illegible]
	All types	[illegible]	74.0	[illegible]	17.7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.5	[illegible]	.6	20.0	.4	7.5	[illegible]	[illegible]
All Units	Open reproduction	[illegible]	75.4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.7	60.0	.5	30.0	[illegible]	[illegible]
	Dense reproduction	[illegible]	[illegible]	190.0	2.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.4	[illegible]	.9	52.5	.8	12.5	[illegible]	[illegible]
	Open pole	[illegible]	[illegible]	115.0	2.0	[illegible]	4.0	[illegible]	[illegible]	[illegible]	2.0	[illegible]	2.5	77.5	1.4	42.5	.8	12.5	[illegible]	[illegible]
	Dense pole	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			[illegible]	[illegible]							[illegible]
	Open mature	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.7	[illegible]	1.5	107.5	.9	50.0	.4	[illegible]
	Dense mature	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.9	2.5	.1	12.5	.3			[illegible]
	All upland	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4.3	1,317.5	[illegible]	[illegible]	2.0	[illegible]	2.4	[illegible]	1.0	275.0	.7	105.0	[illegible]	41,948
	Stream			[illegible]	41.0	[illegible]	[illegible]	547.0	[illegible]											6,757
	All types	34,630.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.9	275.0	.6	105.0	[illegible]	[illegible]

Acreage and Percentage of Acreage Eliminated from Crew Work on Basis of Advance Check Falling Within Each Feet of Live Stem Per Acre Class by Eradication Types

Working Unit Number	Eradication Type	0 Feet Number Acres	0 Feet Percent of Total	1-25 Feet Number Acres	1-25 Feet Percent of Total	26-50 Feet Number Acres	26-50 Feet Percent of Total	51-100 Feet Number Acres	51-100 Feet Percent of Total	101-150 Feet Number Acres	101-150 Feet Percent of Total	151 Feet and Over Number Acres	151 Feet and Over Percent of Total	Total Acres
3 (Camp S-310)	Open reproduction	[illegible]	[illegible]	2.5	[illegible]	2.5	[illegible]	[illegible]	[illegible]	[illegible]	3.1			163
	Dense reproduction	[illegible]	[illegible]	[illegible]	[illegible]							2.5	5.4	46
	Open pole	[illegible]	92.4					[illegible]	[illegible]	[illegible]	1.9	5.0	3.8	130
	Dense pole	[illegible]	[illegible]					[illegible]	31.2			7.5	46.9	16
	Open mature	[illegible]	[illegible]			[illegible]	5.9	[illegible]	4.4	[illegible]	4.4			169
	All upland	[illegible]	86.7	[illegible]	[illegible]	[illegible]	2.4	[illegible]	4.3	[illegible]	2.8	15.0	2.8	524
	All types	[illegible]	86.7	[illegible]	1.0	[illegible]	2.4	[illegible]	4.3	[illegible]	2.8	15.0	2.8	524
7 (Camp P-211)	Open mature	[illegible]	[illegible]			10.0	1.9	[illegible]	2.4	[illegible]	3.4	30.0	5.8	516
	Dense mature	[illegible]	[illegible]	12.5	1.1	[illegible]	1.6	[illegible]	1.3	[illegible]	4.5	90.0	8.1	1,116
	All upland	[illegible]	[illegible]	12.5	.8	[illegible]	1.7	[illegible]	1.7	[illegible]	4.1	120.0	7.3	1,632
	All types	1,377.0	84.4	12.5	.8	[illegible]	1.7	[illegible]	1.7	[illegible]	4.1	[illegible]	7.3	1,632
8 (Camp P-209)	Open mature	[illegible]	[illegible]	5.0	.4	[illegible]	[illegible]	[illegible]	1.5	[illegible]	[illegible]	[illegible]	[illegible]	1,153
	Dense mature	413.0	[illegible]	5.0	1.1	[illegible]	.5	[illegible]	[illegible]	[illegible]	.5	[illegible]	[illegible]	443
	All upland	[illegible]	90.0	10.0	.6	12.5	.8	20.0	1.2	[illegible]	.9	[illegible]	[illegible]	1,596
	All types	1,436.0	90.0	10.0	.6	[illegible]	.8	20.0	1.2	[illegible]	.9	[illegible]	[illegible]	1,596
9 (Camps S-213 F-47)	Dense mature	140.0	[illegible]	2.5	1.6	10.0	[illegible]							153
	All upland	140.0	[illegible]	2.5	1.6	10.0	[illegible]							153
	All types	140.0	91.5	2.5	1.6	10.0	[illegible]							153
33 (Camp F-45)	Dense reproduction	[illegible]	93.0	2.5	3.5	2.5	3.5							72
	Dense pole	[illegible]	85.5	[illegible]	8.7			[illegible]	5.8					66
	All upland	140.5	[illegible]	10.0	[illegible]	2.5	[illegible]	[illegible]	2.2					[illegible]
	All types	[illegible]	[illegible]	10.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					156
34 (Camp F-43)	Open reproduction	[illegible]	92.1	5.0	1.6	[illegible]	[illegible]	7.5	[illegible]	[illegible]	[illegible]	5.0	1.6	320
	Dense reproduction	[illegible]	[illegible]	10.0	[illegible]	[illegible]	[illegible]	2.5	1.3					134
	Open pole	30.0	53.0	10.0	[illegible]	17.5	10.3	7.5	[illegible]	[illegible]	[illegible]	30.0	[illegible]	170
	Dense pole	30.0	[illegible]			7.5	[illegible]	10.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	60
	All upland	[illegible]	78.3	[illegible]	[illegible]	[illegible]	5.0	27.5	[illegible]	[illegible]	.9	37.5	[illegible]	704
	All types	[illegible]	[illegible]	[illegible]	[illegible]	35.0	5.0	[illegible]	[illegible]	[illegible]	2.9	37.5	[illegible]	704
35 (Camp F-44)	Open reproduction	[illegible]	[illegible]	5.0	1.7	15.0	5.1	10.0	[illegible]	7.5	[illegible]	5.0	[illegible]	[illegible]
	Dense reproduction	155.0	90.4	5.0	[illegible]	5.0	[illegible]	[illegible]	[illegible]	[illegible]	1.2			[illegible]
	Open pole	[illegible]	83.4	15.0	[illegible]	22.5	[illegible]	25.0	[illegible]	20.0	[illegible]	50.0	[illegible]	[illegible]
	All upland	1,100.0	[illegible]	[illegible]	[illegible]	[illegible]	3.3	42.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	All types	1,100.0	[illegible]	[illegible]	[illegible]	[illegible]	3.3	42.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
36 (Camp F-42)	Open reproduction	[illegible]	93.7	[illegible]	.6	10.0	2.3	2.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	440
	Dense reproduction	[illegible]	91.5	[illegible]	[illegible]	20.0	1.8	17.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Open pole	[illegible]	90.9	[illegible]	1.8	[illegible]	1.8	7.5	[illegible]					137
	All upland	[illegible]	[illegible]	[illegible]	1.8	[illegible]	2.0	27.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	All types	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.0	27.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
43 (Camp F-40)	Open reproduction	[illegible]	[illegible]	27.5	[illegible]	[illegible]	4.0	7.5	[illegible]	[illegible]	[illegible]	[illegible]	5.4	[illegible]
	Dense reproduction	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.9	2.5	[illegible]	[illegible]	[illegible]	[illegible]	3.1	[illegible]
	Open pole	[illegible]	[illegible]	5.0	.9	7.5	4.4	5.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	173
	Dense pole	[illegible]	[illegible]			2.5	.8			[illegible]	[illegible]	5.0	1.6	[illegible]
	Open mature	[illegible]	[illegible]			12.5	1.8	10.0	[illegible]	[illegible]	[illegible]	[illegible]	6.2	[illegible]
	Dense mature	[illegible]	[illegible]	[illegible]	[illegible]	5.0	3.8	5.0	[illegible]					131
	All upland	[illegible]	[illegible]	27.5	.7	[illegible]	2.1	30.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	All types	[illegible]	[illegible]	37.5	[illegible]	[illegible]	2.1	30.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
44 (Camp F-41)	Dense reproduction	[illegible]	80.6	[illegible]	.7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	9.5	2,269
	Open pole	93.0	62.7	[illegible]	[illegible]	5.0	[illegible]	[illegible]	8.5	[illegible]	[illegible]	30.0	20.3	146
	Open mature	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	32.5	6.5	[illegible]
	All upland	[illegible]	79.5	25.0	[illegible]	[illegible]	[illegible]	[illegible]	5.5	[illegible]	[illegible]	[illegible]	[illegible]	3,321
	All types	[illegible]	[illegible]	[illegible]	.8	[illegible]	[illegible]	[illegible]	5.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
45 (Camp F-39)	Open reproduction	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Dense reproduction	471.0	[illegible]	[illegible]	.6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			496
	Open pole	217.0	[illegible]	[illegible]	.7	[illegible]	4.0	10.0	[illegible]	10.0	[illegible]	[illegible]	[illegible]	377
	Dense pole	[illegible]	[illegible]	[illegible]	.6	[illegible]	[illegible]							333
	Open mature	[illegible]	[illegible]	15.0	1.3	7.5	[illegible]	[illegible]	2.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	All upland	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	All types	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
All Units	Open reproduction	[illegible]	67.2	[illegible]	1.9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.7	[illegible]	[illegible]	[illegible]
	Dense reproduction	[illegible]	66.4	67.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.7	[illegible]	[illegible]	[illegible]
	Open pole	[illegible]	79.9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Dense pole	[illegible]	91.5	10.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Open mature	[illegible]	87.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Dense mature	[illegible]	87.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	All upland	14,478.0	86.4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	All types	14,479.0	86.4	[illegible]	1.3	[illegible]	2.1	[illegible]	[illegible]	[illegible]	2.0	[illegible]	[illegible]	16,765

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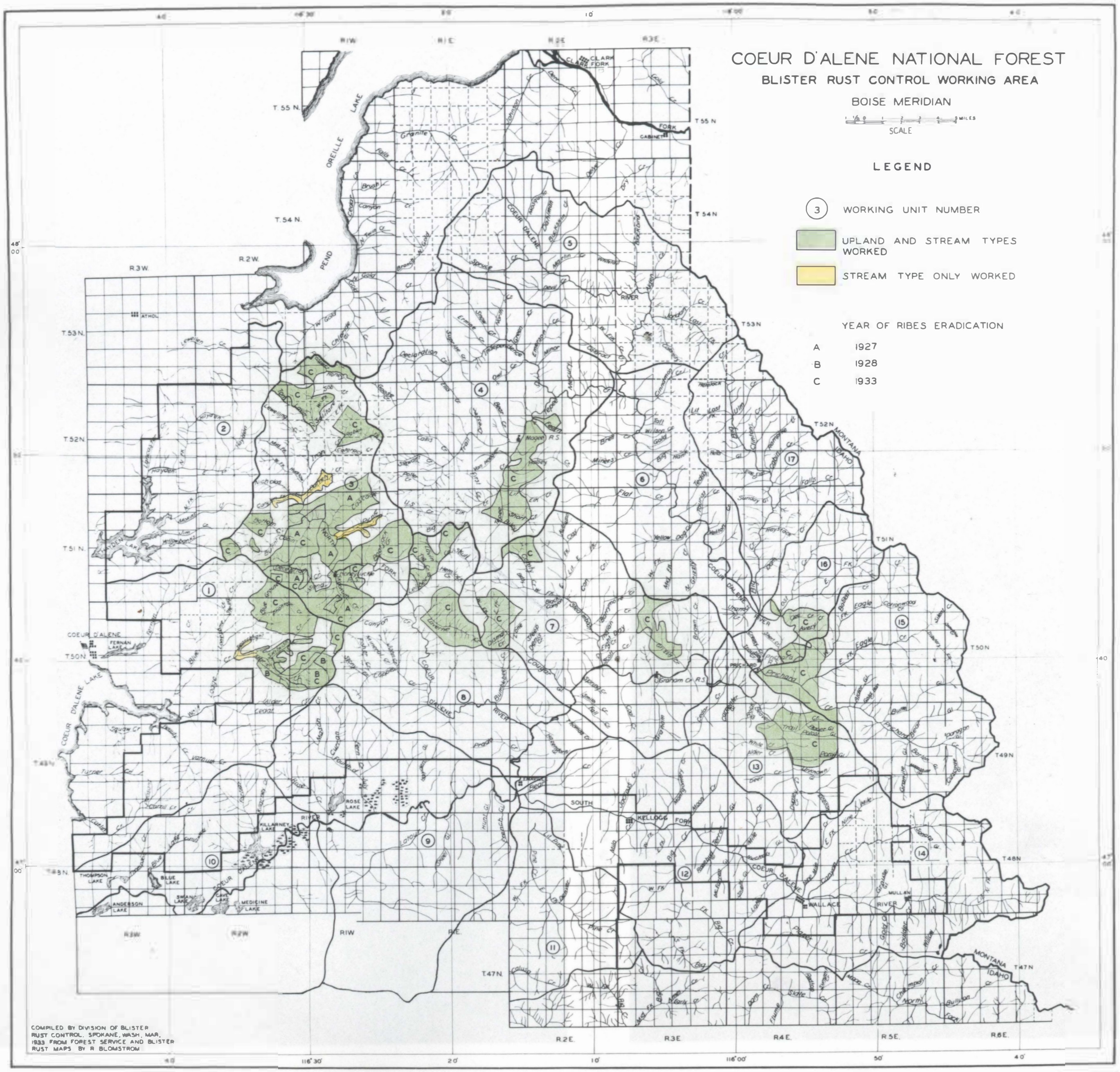
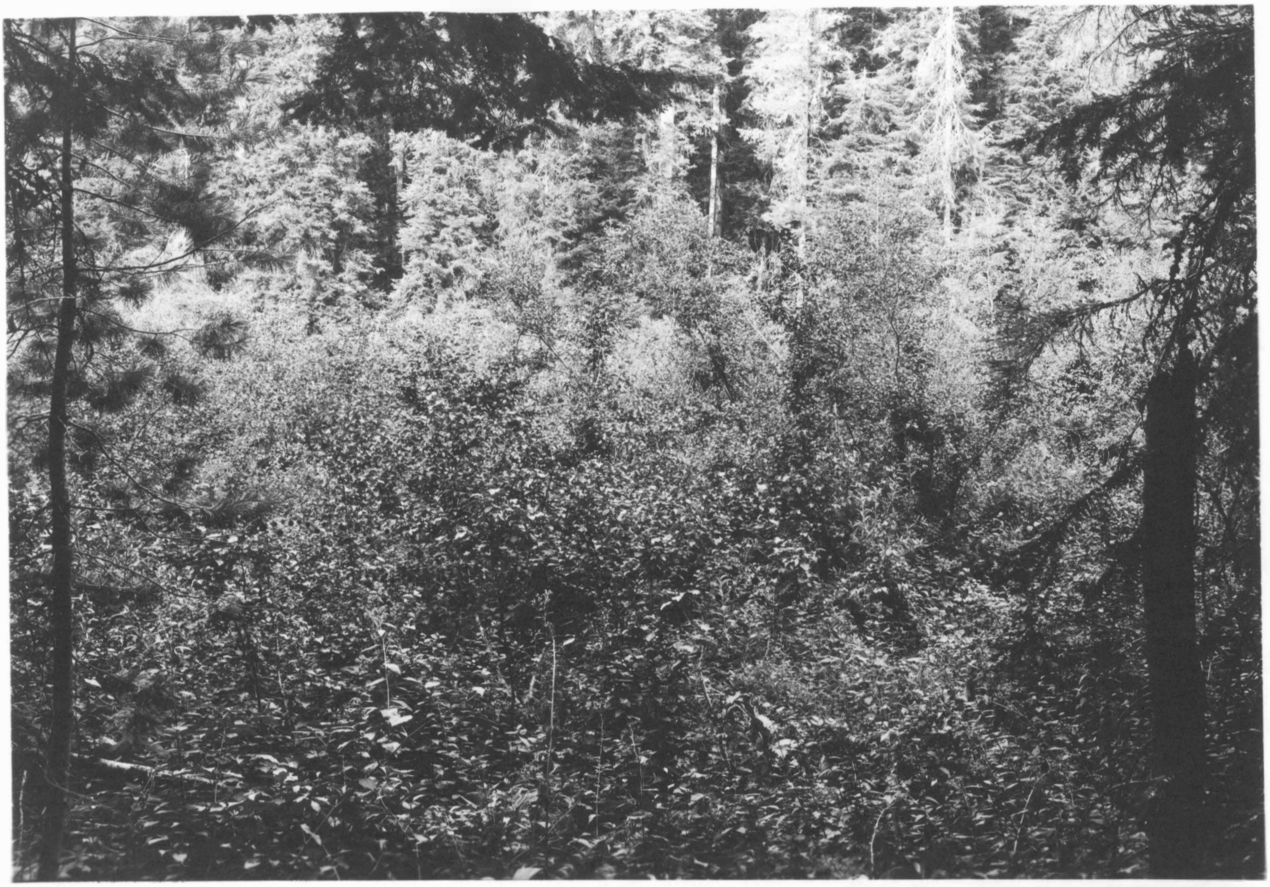
W. F. Painter

Working Units Numbers 2, 3, 7, 8 and 9 are on the Potlatch Timber Protective Association; Working Units Numbers 32, 33, 34, 35, 36, 43, 44 and 45 are on the St. Joe National Forest.
Data Secured on 4 Percent Sample Check.

ANNUAL REPORT 1933.
W G GUERNSEY





W-1221. Type of brush along stream bottoms before slashing. Ribes average 30,000 feet of live stem in this area. Laverne Creek, Coeur d'Alene National Forest.

W-1221-1. Same area as shown in picture W-1221 after slashing and burning.

RIBES ERADICATION - COEUR D'ALENE PROJECT

By
W. G. Guernsey, Junior Forester
Division of Blister Rust Control
and
Howard Drake, Logging Engineer
Forest Service

INTRODUCTION

Previous to the field season of 1933 some experimental Ribes eradication work had been done on the Coeur d'Alene National Forest. This consisted of the work of five camps during 1927 and two camps in 1928. Although many benefits were derived from these experiments, the very nature of the work made it necessary to cover these same areas in 1933.

During the 1933 field season the Ribes eradication work was done by six ECW camps, 25 regular camps and one bulldozer camp. Four of the ECW camps were located in the vicinity of Prichard and two on Tepee Creek near the Magee Ranger Station. Of the 25 small camps, 15 were located between the head of the North Fork of the Coeur d'Alene River and the mouth of Leiberg Creek, 3 on Wolf Lodge Creek, 2 on Laverne Creek, one on Cougar Creek and one at McDonald Spring. The bulldozer worked on an area between Iron Creek and Honeysuckle Ranger Station and later moved to the junction of Big Elk and Tepee Creeks.

GENERAL DESCRIPTION OF AREA

Almost the entire area worked can be classed as white pine type, although only limited areas contain pure white pine stands. In general, the area is heavily timbered with reproduction, pole and mature stands. All age classes, eradication types and working conditions were found. None of the work was done on planted areas. The work of the regular camps was confined to the North Fork of the Coeur d'Alene River and its tributaries, with the exception of the camps on Cougar Creek and at McDonald Spring. A major portion of this work was done in mature timber and on cut-over areas. For want of a better classification the cut-over areas with a good residual stand were classed as open mature. The work of four ECW camps was on partially burned-over areas that support an excellent stand of white pine reproduction. The other two camps worked in average timber conditions.

Working conditions were difficult over the entire area. Brush and heavy concentrations of Ribes seedlings were prevalent on cut-over areas which were classed as open mature. These conditions caused a greater number of man days per acre than on uncut mature types. Working conditions were difficult at the head of the North Fork of the Coeur d'Alene River because of dense brush and heavy Ribes conditions. Small areas at Wolf Lodge Creek, Cougar Creek and the Delta were eliminated, by advance check, from crew work.

Ribes lacustre, R. viscosissimum, R. inerme and R. irriguum were the species reported. R. lacustre and R. viscosissimum were generally distributed over the area and R. inerme was found in practically all of the stream type

worked. Heavy concentrations of R. inerme and brush were encountered on the North Fork of the Coeur d'Alene River above the Honeysuckle Ranger Station and on Tepee Creek drainage. The bulldozer was used on these areas. Heavy association of Ribes and brush on Laverne Creek and Beaver Creek made slashing and burning practicable.

ORGANIZATION AND ADMINISTRATION

The work on the Coeur d'Alene National Forest was under the joint direction of the Forest Service and the Division of Blister Rust Control, cooperating much as in past seasons.

There were two unit supervisors who were responsible for directing the Ribes eradication work of the six ECW camps. Approximately one-half of the men in one of the ECW camps on Tepee Creek were engaged in road work.

The 25 regular camps were organized on approximately the same basis as in previous seasons. In addition to the Ribes eradication personnel, one checker was assigned to each regular camp. Six unit supervisors, each responsible for from three to six camps, supervised the work of the regular camp personnel.

PERSONNEL

The personnel of five of the ECW camps aside from the camp superintendents and foremen was composed of men from New York and New Jersey. Two of these camps were composed of negroes. The other camp was composed entirely of Idaho men. The men in these camps were on the average much younger than those customarily employed for such work. In a great majority of cases they had never done woods work and many of them had never performed manual labor.

The personnel of the regular camps included a nucleus of men experienced in blister rust control work and the remainder was made up of woodsmen taken from the region. These regular camps were financed by regular Forest Service appropriations until the latter part of August when NIRA money was made available. No new camps were established, but additional men secured from local relief agencies were placed in each of the existing camps. Of the 25 camp bosses used in the regular camps, only four had previous experience in handling blister rust camps and 9 had worked on blister rust control in previous years. The remainder were woodsmen with proven ability in handling men.

METHODS AND EQUIPMENT

Aside from the work of the bulldozer, which is covered in another report, and the slashing work done on Laverne and Beaver Creeks, all work was done by the hand pulling method with the regular 3-man crew. In the ECW camps each foreman was assigned a definite block to be worked by the men turned over to him. Any special equipment needed and the necessary twine for these camps were furnished by the Forest Service. The equipment necessary for ten of the regular camps was supplied by the Division of Blister Rust Control; the remaining 15 were equipped by the Forest Service.

STATEMENT OF EXPENDITURES

I. Expenditure by Appropriations
Fiscal Year 1933 (last half)

A. Regular Appropriations (regular camps)

1. Forest Service Blister Rust	$20,741.74		
Forest Service contributed time	240.00		
2. Division of Blister Rust Control	3,372.68		
Total		$24,354.42	

B. Regular and ECW Appropriations (ECW camps)

1. Forest Service ECW	$ 1,420.29		
2. Division of Blister Rust Control	6,170.20		
Total		$ 7,590.49	
Total, fiscal year 1933			$31,944.91

Fiscal Year 1934 (first half)

A. Regular Appropriations (regular camps)

1. Forest Service Blister Rust	$132,951.45		
Forest Service contributed time	1,200.00		
2. Division of Blister Rust Control	3,256.61		
Total		$137,408.06	

B. NIRA Appropriations (NIRA camps)

1. Forest Service Blister Rust	$37,300.58		
Forest Service contributed time.	692.36		
2. Division of Blister Rust Control	2,605.79		
Total		$ 40,598.73	

C. Regular and ECW Appropriations (ECW camps)

1. Forest Service Blister Rust ECW.	$24,236.15		
Forest Service contributed time	830.07		
2. Division of Blister Rust Control	3,445.30		
Total		$ 28,511.52	
Total fiscal year 1934			$206,518.31
Total expenditures			$238,463.22

II. Classified Expenditures Calendar Year 1933
(Regular and NIRA Appropriations)

A. Salaries

1. Forest Service	$12,942.14	
Division of Blister Rust Control	3,342.61	
Total		$16,284.75
2. Forest Service NIRA	$ 3,577.40	
Division of Blister Rust Control NIRA	$ 1,507.46	
Total		$ 5,084.86

B. Wages

1. Forest Service	$78,533.17	
Forest Service NIRA	22,029.88	
Total		$100,563.05
Carried forward		$121,932.66

Brought Forward........................$121,932.66

C. Travel and Transportation
   1. Forest Service...............$4,659.95
   2. Forest Service NIRA........... 4,012.18
   3. Division of Blister Rust Control...................... 993.02
   4. Division of Blister Rust Control NIRA.................. 914.93
      Total............................ $ 10,580.08

D. Subsistence Supplies
   1. Forest Service...............$42,797.96
   2. Forest Service NIRA.......... 8,187.98
      Total............................ $ 50,985.94

E. Supplies and Equipment
   1. Camp, Forest Service.........$13,046.82
      Special NIRA................. 3,132.50
   2. Eradication, Division of Blister Rust Control......... 792.82
   3. Special Equipment, Division of Blister Rust Control...... 1,380.98
      Total............................$ 18,353.12

F. Miscellaneous
   1. Forest Service.............. 206.15
   2. Division of Blister Rust Control..................... 303.26
      Total............................$ 509.41
      Total Regular and NIRA Expenditures.............................$202,361.21

III. Classified Expenditures Calendar Year 1933 (Forest Service, ECW, Division of Blister Rust Control Regular Appropriation)

A. Salaries
   1. Forest Service ECW...........$17,433.64
   2. Division of Blister Rust Control.................... 6,575.91
      Total............................$ 24,009.55

B. Wages
   1. Forest Service ECW.................... 7,683.27

C. Travel and Transportation
   1. Forest Service ECW..........$ 1,138.50
   2. Division of Blister Rust Control.................... 1,070.60
      a. Expenses............... 169.22
      Total............................$ 2,378.32

Brought forward...............$34,071.14 $202,361.21

D. Supplies and Equipment
1. Purchase of supplies and equipment
a. Forest Service ECW....$231.10
b. Division of Blister Rust Control
(1) Eradication....1,583.75
(2) Special....... 216.02
Total....................$ 2,030.87

Total expenditures on ECW............................ $ 36,102.01

Total expenditures all appropriations........................ $238,463.22

I. Activity Costs - Regular and NIRA camps
A. Supervision
1. Direct project supervision........$5,104.34
2. Temporary supervision.............12,270.59
3. Checking
a. Overhead.................... 1,155.69
B. Wages....................... 5,944.03
4. Preeradication survey, fall 1932... 508.41
5. All travel and expenses........... 2,112.78
Total...............................$27,095.84

B. Transportation
1. Transportation of men............. 311.17
2. Freight, drayage.. .... 239.62
3. Packing.......................... 4,026.04
4. Trucking......................... 4,105.30
Total......... ....$ 8,682.13

C. Camp Equipment........................$12,020.95
D. Eradication Supplies (twine)........... 792.82
E. Camps................................ 4,900.32
F. Hand pulling..........................132,057.14
G. Miscellaneous expenses................ 304.58
Total..$185,853.78
$185,853.78 ÷ 40,817 acres = $4.55, cost per acre
Prorated subsistence total.........$46,254.44

II. Activity Costs - Machine Stream Type (Bulldozer)
A. Supervision...........................$ 722.40
B. Wages................................ 3,516.00
C. Travel................................ 45.61
D. Transportation........................ 125.00
E. Equipment...
a. Special (Dep. @ 1.25 per hour).... 1,010.00

Carried forward.........$5,419.01

	Brought forward	$5,419.01	
F.	Subsistence supplies	$ 689.50	
G.	Machine fuel supplies	575.00	
	" repairs	360.00	
H.	Burning		
	1. Wages	400.00	
	2. Pump rent, gas and oil	54.00	
	Total		$7,497.51

($3,867.93 undepreciated special equipment)
$7,497.51 ÷ 157.8 acres = $47.51 per acre.

Explanation of Activity Costs, 1933
Regular and Nira Camps

I. A. Supervision

1. Direct project supervision includes contributed time of Drake, prorated salaries of Guernsey and Riley.

2. Temporary supervision includes salaries of unit supervisors and camp bosses in the small camps.

3. Checking (overhead) includes a portion of Swanson's salary plus Hatton's and Pence's wages.

4. Preeradication survey figure is one-quarter of the total cost of 1932 fall survey.

B. Transportation is listed by major transportation methods.

C. Equipment. No depreciated equipment figure is taken. The greater portion of the equipment was rented from central purchase or borrowed from the Forest and Division of Blister Rust Control.

E. Camps. Includes the total expenditures for putting up camp plus its prorated share of the subsistence charge.

F. Hand pulling includes the total wages expended for Ribes hand pulling plus its prorated share of the subsistence charge.

II. Activity Costs - Machine Stream Type (Bulldozer).

A. Supervision. Includes Breakey's time while on work.

B. Equipment includes cost of machine complete ($4,877.93) depreciated on a 4,000 hour basis. Machine worked 808 hours during 1933.

RESULTS OF RIBES ERADICATION OPERATIONS

The results of Ribes eradication are presented in the following tables:

TABLE NO. 1

SUMMARY OF RIBES ERADICATION BY TYPES, ECW AND NIRA CAMPS
COEUR D'ALENE NATIONAL FOREST, 1933

		Initial Eradication									First Mop-up							Total Eradication					
							Per Acre Basis								Per Acre Basis								
Name	Eradication Type	Acres	Effective Man Days	Total Ribes	Machine Hours	Total Cost	Man Days	Ribes	Machine Hours	Cost	Acres	Effective Man Days	Total Ribes	Total Cost	Man Days	Ribes	Cost	Acres Initial Eradication	First Mop-up	Total Effective Man Days	Total Ribes	Machine Hours	Total Cost
ECW Camps	Open reproduction	4,865	6,784	756,026			1.39	155										4,865		6,784	756,026		
	Dense reproduction	3,288	3,784	355,681			1.15	108										3,288		3,784	355,681		
	Open pole	6,417	2,993	464,648			.47	72										6,417		2,993	464,648		
	Dense pole	1,001	355	39,575			.35	40										1,001		355	39,575		
	Open mature	832	492	59,227			.59	71										832		492	59,227		
	Brush	2,353	1,881	206,261			.80	88										2,353		1,881	206,261		
	All upland	18,756	16,289	1,881,418			.87	100										18,756		16,289	1,881,418		
	Stream (hand)	1,523	6,614	1,200,337			4.34	788										1,523		6,614	1,200,337		
	Stream (slash)	9	313				34.78											9		313			
	All stream	1,532	6,927	1,200,337			4.52	* 788										1,532		6,927	1,200,337		
	All types	20,288	23,216	3,081,755			1.14	* 152										20,288		23,216	3,081,755		
NIRA Camps	Open reproduction	2,954	5,202	1,004,236		$ 28,777.57	1.76	340		$ 9.74	375	336	122,172	$ 1,858.76	.90	326	$4.96	2,954	375	5,538	1,126,408		$ 30,636.33
	Dense reproduction	1,463	1,280	140,511		7,080.99	.87	96		4.84	372	373	39,327	2,063.44	1.00	106	5.55	1,463	372	1,653	179,838		9,144.43
	Open pole	5,683	2,340	506,342		12,944.93	.41	89		2.28	2,571	1,358	329,110	7,512.48	.53	128	2.92	5,683	2,571	3,698	835,452		20,457.41
	Dense pole	1,345	419	46,962		2,317.92	.31	35		1.72	4	3	138	16.60	.75	34	4.15	1,345	4	422	47,100		2,334.52
	Open mature	18,788	12,882	2,082,423		71,263.49	.69	111		3.79	3,510	2,571	704,341	14,222.83	.73	201	4.05	18,788	3,510	15,453	2,786,764		85,486.32
	Dense mature	1,378	442	47,387		2,445.15	.32	34		1.77	202	227	31,937	1,255.77	1.12	158	6.22	1,378	202	669	79,324		3,700.92
	Brush	518	1,826	612,985		10,101.47	3.52	1,183		19.50								518		1,826	612,985		10,101.47
	All upland	32,129	24,391	4,440,846		$134,931.52	.76	138		$ 4.20	7,034	4,868	1,227,025	$ 26,929.88	.69	174	$3.83	32,129	7,034	29,259	5,667,871		$161,861.40
	Stream (hand)	1,310	3,576	926,027		19,782.51	2.73	707		15.10	330	587	85,910	3,247.30	1.78	260	9.84	1,310	330	4,163	1,011,937		23,029.81
	Stream (machine)	158	697		798	7,497.51	4.41		5.05	47.45								158		697		798	7,497.51
	Stream (slash)	14	174			962.57	12.43			68.76								14		174			962.57
	All stream	1,482	4,447	926,027		28,242.59	3.00	* 707		19.06	330	587	85,910	3,247.30	1.78	260	9.84	1,482	330	5,034	1,011,937		31,489.89
	All types	33,611	28,838	5,366,873		$163,174.11	.86	* 160		$ 4.85	7,364	5,455	1,312,935	$ 30,177.18	.74	178	$4.10	33,611	7,364	34,293	6,679,808		$193,351.29
ECW and NIRA Camps	Open reproduction	7,819	11,986	1,760,262			1.53	225			375	336	122,172		.90	326		7,819	375	12,322	1,882,434		
	Dense reproduction	4,751	5,064	496,192			1.07	104			372	373	39,327		1.00	106		4,751	372	5,437	535,519		
	Open pole	12,100	5,333	970,990			.44	80			2,571	1,358	329,110		.53	128		12,100	2,571	6,691	1,300,100		
	Dense pole	2,346	774	86,537			.33	37			4	3	138		.75	34		2,346	4	777	86,675		
	Open mature	19,620	13,374	2,141,650			.68	109			3,510	2,571	704,341		.73	201		19,620	3,510	15,945	2,845,991		
	Dense mature	1,378	442	47,387			.32	34			202	227	31,937		1.12	158		1,378	202	669	79,324		
	Brush	2,871	3,707	819,246			1.29	285										2,871		3,707	819,246		
	All upland	50,885	40,680	6,322,264			.80	124			7,034	4,868	1,227,025		.69	174		50,885	7,034	45,548	7,549,289		
	Stream (hand)	2,833	10,190	2,126,364			3.60	751			330	587	85,910		1.78	260		2,833	330	10,777	2,212,274		
	Stream (machine)	158	697		798		4.41		5.05									158		697		796	
	Stream (slash)	23	487				21.17											23		487			
	All stream	3,014	11,374	2,126,364			3.77	* 751			330	587	85,910		1.78	260		3,014	330	11,961	2,212,274		
	All types	53,899	52,054	8,448,628			.97	* 157			7,364	5,455	1,312,935		.74	178		53,899	7,364	57,509	9,761,563		

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*Stream machine and stream slash acreage omitted in computation because no Ribes count taken.

TABLE NO. 2

INITIAL RIBES ERADICATION BY WORKING UNITS
COEUR D'ALENE NATIONAL FOREST, 1933

Working Unit Number	Eradication Type	Acres	Man Days	Number of Ribes Pulled: Ribes lacustre	Ribes viscosissimum	Ribes inerme	Ribes irriguum	Total Ribes	Total Machine Hours	Per Acre Basis: Man Days	Ribes	Machine Hours
1	Open reproduction	211	28	367	399			766		.13	4	
	Dense reproduction	655	261	26,868	[illegible]	3		27,887		.40	43	
	Open pole	4,792	1,749	141,861	198,132	756		340,749		.36	71	
	Dense pole	1,009	203	23,414	3,908	324		27,646		.20	27	
	Open mature	1,614	846	128,376	14,505			142,881		.52	89	
	Dense mature	137	46	3,612	1,348			4,960		.34	36	
	Brush	193	76	11,630	3,553			15,183		.39	79	
	All upland	8,611	3,209	336,128	222,861	1,083		560,072		.37	65	
	All stream	149	380	73,316	2,765	235		76,316		2.55	512	
	All types	8,760	3,589	409,444	225,626	1,318		636,388		.41	73	
3	Open reproduction	2,596	4,619	600,963	297,547	658		899,168		1.78	346	
	Dense reproduction	760	979	90,141	13,631	231		104,003		1.29	137	
	Open pole	408	364	111,027	5,839	75		116,941		.89	287	
	Dense pole	86	76	5,859	3,917	6		9,782		.88	114	
	Open mature	8,622	5,851	766,746	286,861	1,365		1,054,972		.68	122	
	Dense mature	330	214	26,991	401	176		27,568		.65	84	
	Brush	92	523	91,045	33,770			124,815		5.68	1,357	
	All upland	12,894	12,626	1,692,772	641,966	2,511		2,337,249		.98	181	
	Stream (hand)	782	1,567	453,145	13,282	25,912		492,339		2.00	630	
	Stream (machine)	111	569						614	5.13		5.53
	All stream	893	2,136	453,145	13,282	25,912		492,339		2.39	630*	
	All types	13,787	14,762	2,145,917	655,248	28,423		2,829,588		1.07	207*	
4	Open reproduction	3,078	2,809	274,195	1,937	77,465		353,597		.91	115	
	Dense reproduction	1,411	845	53,963	12	1,365		55,340		.60	39	
	Open pole	301	303	20,915	70	3,314		24,299		1.01	81	
	Open mature	221	101	16,463		2,394		18,857		.46	85	
	Brush	452	104	9,851	2,394	30		12,275		.23	27	
	All upland	5,463	4,162	375,387	4,413	84,568		464,368		.76	85	
	Stream (hand)	344	1,755	124,083	135	149,863		274,081		5.10	797	
	Stream (machine)	47	128						184	2.72		3.91
	All stream	391	1,883	124,083	135	149,863		274,081		4.82	797*	
	All types	5,854	6,045	499,470	4,548	234,431		738,449		1.03	127*	
7	Open reproduction	469	1,973	70,161	157,220			227,381		4.21	485	
	Open pole	1,260	1,420	52,823	222,001			274,824		1.13	217	
	Open mature	3,419	1,690	85,193	58,764	5,147		149,104		.49	44	
	Dense mature	740	89	3,130	1,002	580		4,712		.12	6	
	Brush	292	896	15,933	78,029			93,962		3.07	322	
	All upland	6,180	6,068	227,240	517,016	5,727		749,983		.98	129	
	All stream	147	527	88,673	5,024	6,148		99,845		3.59	679	
	All types	6,327	6,595	315,913	522,040	11,875		849,828		1.04	134	
8	Dense reproduction	48	40	5,006	3,615			8,621		.83	180	
	Open pole	483	227	20,735	27,917			48,652		.47	101	
	Dense pole	250	140	8,985	549			9,534		.56	38	
	Open mature	5,133	4,495	399,025	336,384	57		735,466		.87	143	
	Dense mature	171	93	4,442	5,705			10,147		.54	59	
	Brush	233	1,227	107,866	365,121			472,987		5.27	2,030	
	All upland	6,318	6,222	546,059	739,291	57		1,285,407		.98	203	
	Stream (hand)	272	1,197	157,298	21,798	90,169		269,265		4.40	990	
	Stream (slash)	14	174							12.43		
	All stream	286	1,371	157,298	21,798	90,169		269,265		4.79	990*	
	All types	6,604	7,593	703,357	761,089	90,226		1,554,672		1.15	236*	
13	Open reproduction	176	112	2,515	721	9		3,245		.64	18	
	Dense reproduction	87	72	1,322	884	277		2,483		.83	29	
	Open pole	2,575	289	23,929	11,929	318		36,176		.11	14	
	Dense pole	899	100	2,820	469	99		3,388		.11	4	
	Brush	1,349	38	745	202	25		972		.03	1	
	All upland	5,086	611	31,331	14,205	728		46,264		.12	9	
	Stream (hand)	641	3,431	450,853	14,855	161,378	21	627,607		5.35	979	
	Stream (slash)	9	313							34.78		
	All stream	650	3,744	450,853	14,855	161,378	21	627,607		5.76	979*	
	All types	5,736	4,355	482,184	29,060	162,606	21	673,871		.76	118*	
15	Open reproduction	822	1,679	52,018	137,568	13,366		202,952		2.04	247	
	Dense reproduction	1,308	1,459	38,018	112,711	656		151,385		1.12	116	
	Open pole	1,767	296	29,306	31,409	221	4,560	65,496		.17	37	
	Dense pole	46	176	13,395	13,649			27,044		3.83	588	
	Open mature	185	76	3,989	6,627			10,616		.41	57	
	All upland	4,128	3,686	136,726	301,964	14,243	4,560	457,493		.89	111	
	All stream	465	1,232	128,561	607	133,645	12,566	275,379		2.65	592	
	All types	4,593	4,918	265,287	302,571	147,888	17,126	732,872		1.07	160	
16	Open reproduction	467	766	22,927	48,868	249	1,109	73,153		1.64	157	
	Dense reproduction	482	1,408	35,411	110,102	739	221	146,473		2.92	304	
	Open pole	514	685	32,366	31,203	284		63,853		1.33	124	
	Dense pole	56	79	4,310	4,833			9,143		1.41	163	
	Open mature	426	315	8,909	20,402	440	3	29,754		.74	70	
	Brush	260	843	4,962	93,075	824	191	99,052		3.24	381	
	All upland	2,205	4,096	108,885	308,483	2,536	1,524	421,428		1.86	191	
	All stream	33	101	7,808	3,318	406		11,532		3.06	349	
	All types	2,238	4,197	116,693	311,801	2,942	1,524	432,960		1.88	193	
All Units	Open reproduction	7,819	11,986	1,023,146	644,260	91,747	1,109	1,760,262		1.53	225	
	Dense reproduction	4,751	5,064	250,729	241,971	3,271	221	496,192		1.07	104	
	Open pole	12,100	5,333	432,962	528,500	4,968	4,560	970,990		.44	80	
	Dense pole	2,346	774	58,783	27,325	429		86,537		.33	37	
	Open mature	19,620	13,374	1,408,701	723,543	9,403	3	2,141,650		.68	109	
	Dense mature	1,378	442	38,175	8,456	756		47,387		.32	34	
	Brush	2,871	3,707	242,032	576,144	879	191	819,246		1.29	285	
	All upland	50,885	40,680	3,454,528	2,750,199	111,453	6,084	6,322,264		.80	124	
	Stream (hand)	2,833	10,190	1,483,737	61,784	568,256	12,587	2,126,364		3.60	751	
	Stream (slash)	23	487							21.17		
	Stream (machine)	158	697						798	4.41		5.05
	All stream	3,014	11,374	1,483,737	61,784	568,256	12,587	2,126,364		3.77	751*	
	All types	53,899	52,054	4,938,265	2,811,983	679,709	18,671	8,448,628		.97	157*	

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*Stream machine and stream slash acreage omitted in computation because no Ribes count taken.

TABLE NO. 3

FIRST MOP-UP, RIBES ERADICATION BY WORKING UNITS
COEUR D'ALENE NATIONAL FOREST, 1933

Working Unit Number	Eradication Type	Acres	Man Days	Number of Ribes Pulled R. lac.	R. Vis.	R. inerme	Total Ribes	Per Acre Basis Man Days	Ribes
1	Open pole	596	76	1,146	629		1,775	.13	3
	Dense pole	4	3	95	43		138	.75	35
	All upland	600	79	1,241	672		1,913	.13	3
	All stream	40	74	9,307	6	560	9,873	1.85	247
	All types	640	153	10,548	678	560	11,786	.24	18
3	Open reproduction	375	336	92,838	29,024	310	122,172	.90	326
	Dense reproduction	372	373	37,503	1,813	11	39,327	1.00	106
	Open pole	1,975	1,282	260,758	63,328	3,249	327,335	.65	166
	Open mature	3,510	2,571	462,011	233,004	9,326	704,341	.73	201
	Dense mature	202	227	31,461	476		31,937	1.12	158
	All upland	6,434	4,789	884,571	327,645	12,896	1,225,112	.74	190
	All stream	290	513	58,967	8,250	8,820	76,037	1.77	262
	All types	6,724	5,302	943,538	335,895	21,716	1,301,149	.79	194
All Units	Open reproduction	375	336	92,838	29,024	310	122,172	.90	326
	Dense reproduction	372	373	37,503	1,813	11	39,327	1.00	106
	Open pole	2,571	1,358	261,904	63,957	3,249	329,110	.53	128
	Dense pole	4	3	95	43		138	.75	35
	Open mature	3,510	2,571	462,011	233,004	9,326	704,341	.73	201
	Dense mature	202	227	31,461	476		31,937	1.12	158
	All upland	7,034	4,868	885,812	328,317	12,896	1,227,025	.69	174
	All stream	330	587	68,274	8,256	9,380	85,910	1.78	260
	All types	7,364	5,455	954,086	336,573	22,276	1,312,935	.74	178

TABLE NO 4

SUMMARY OF RIBES ERADICATION BY WORKING UNITS
COEUR D'ALENE NATIONAL FOREST, 1933

Working Unit Number	Eradication Type	Acres Initial Eradication	Acres First Mop-up	Man Days	Number of Ribes Pulled: Ribes lacustre	Ribes viscosissimum	Ribes inerme	Ribes irriguum	Total Ribes	Total Machine Hours
1	Open reproduction	211		38	367	399			766	
	Dense reproduction	655		261	26,868	1,016	3		27,887	
	Open pole	4,792	596	1,325	143,007	198,761	756		342,524	
	Dense pole	1,009	4	206	23,509	3,951	324		27,784	
	Open mature	1,614		846	128,376	14,505			142,881	
	Dense mature	137		46	3,612	1,348			4,960	
	Brush	193		76	11,630	3,553			15,183	
	All upland	8,611	600	3,288	337,369	223,533	1,083		561,985	
	All stream	149	40	454	82,623	2,771	795		86,189	
	All types	8,760	640	3,742	419,992	226,304	1,878		648,174	
3	Open reproduction	2,596	375	4,955	693,801	326,571	968		1,021,340	
	Dense reproduction	760	372	1,352	127,644	15,444	242		143,330	
	Open pole	408	1,975	1,646	371,785	69,167	3,324		444,276	
	Dense pole	86		76	5,859	3,917	6		9,782	
	Open mature	8,622	3,510	8,422	1,228,757	519,865	10,691		1,759,313	
	Dense mature	330	202	441	58,452	877	176		59,505	
	Brush	92		523	91,045	33,770			124,815	
	All upland	12,894	6,434	17,415	2,577,343	969,611	15,407		3,562,361	
	Stream (hand)	782	290	2,080	512,112	21,532	34,732		568,376	
	Stream (machine)	111		569						614
	All stream	893	290	2,649	512,112	21,532	34,732		568,376	
	All types	13,787	6,724	20,064	3,089,455	991,143	50,139		4,130,737	
4	Open reproduction	3,078		2,809	274,195	1,937	77,465		353,537	
	Dense reproduction	1,411		845	53,963	12	1,365		55,340	
	Open pole	301		303	20,915	70	3,314		24,299	
	Open mature	221		101	16,463		2,394		18,857	
	Brush	452		104	9,851	2,394	30		12,275	
	All upland	5,463		4,162	375,387	4,413	84,568		464,368	
	Stream (hand)	344		1,755	124,083	135	149,863		274,081	
	Stream (machine)	47		128						184
	All stream	391		1,883	124,083	135	149,863		274,081	
	All types	5,854		6,045	499,470	4,548	234,431		738,449	
7	Open reproduction	469		1,973	70,161	157,220			227,381	
	Open pole	1,260		1,420	52,823	222,001			274,824	
	Open mature	3,419		1,690	85,193	58,764	5,147		149,104	
	Dense mature	740		89	3,130	1,002	580		4,712	
	Brush	292		896	15,933	78,029			93,962	
	All upland	6,180		6,068	227,240	517,016	5,727		749,983	
	All stream	147		527	88,673	5,024	6,148		99,845	
	All types	6,327		6,595	315,913	522,040	11,875		849,828	
8	Dense reproduction	48		40	5,006	3,615			8,621	
	Open pole	483		227	20,735	27,917			48,652	
	Dense pole	250		140	8,985	549			9,534	
	Open mature	5,133		4,495	399,025	336,384	57		735,466	
	Dense mature	171		93	4,442	5,705			10,147	
	Brush	233		1,227	107,866	365,121			472,987	
	All upland	6,318		6,222	545,059	739,291	57		1,285,407	
	Stream (hand)	272		1,197	157,238	21,798	90,169		269,265	
	Stream (slash)	14		174						
	All stream	286		1,371	157,238	21,798	90,169		269,265	
	All types	6,604		7,593	703,357	761,089	90,226		1,554,672	
13	Open reproduction	176		112	2,515	721	9		3,245	
	Dense reproduction	87		72	1,322	884	277		2,483	
	Open pole	2,575		289	23,929	11,929	318		36,176	
	Dense pole	899		100	2,820	469	99		3,388	
	Brush	1,349		38	745	202	25		972	
	All upland	5,086		611	31,331	14,205	728		46,264	
	Stream (hand)	641		3,431	450,853	14,855	161,878	21	627,607	
	Stream (slash)	9		313						
	All stream	650		3,744	450,853	14,855	161,878	21	627,607	
	All types	5,736		4,355	482,184	29,060	162,606	21	673,871	
15	Open reproduction	832		1,679	52,018	137,568	13,366		202,952	
	Dense reproduction	1,308		1,459	38,018	112,711	656		151,385	
	Open pole	1,767		296	29,306	31,409	221	4,560	65,496	
	Dense pole	46		176	13,395	13,649			27,044	
	Open mature	185		76	3,989	6,627			10,616	
	All upland	4,128		3,686	136,726	301,964	14,243	4,560	457,493	
	All stream	465		1,232	128,561	607	133,645	12,566	275,379	
	All types	4,593		4,918	265,287	302,571	147,888	17,126	732,872	
16	Open reproduction	467		766	22,927	48,868	249	1,109	73,153	
	Dense reproduction	482		1,408	35,411	110,102	739	221	146,473	
	Open pole	514		685	32,366	31,203	284		63,853	
	Dense pole	56		79	4,310	4,833			9,143	
	Open mature	426		315	8,909	20,402	440	3	29,754	
	Brush	260		843	4,962	93,075	824	191	99,052	
	All upland	2,205		4,096	108,885	308,483	2,536	1,524	421,428	
	All stream	33		101	7,808	3,318	406		11,532	
	All types	2,238		4,197	116,693	311,801	2,942	1,524	432,960	
All Units	Open reproduction	7,819	375	12,322	1,115,984	673,284	92,057	1,109	1,882,434	
	Dense reproduction	4,751	372	5,437	288,232	243,784	3,282	221	535,519	
	Open pole	12,100	2,571	6,691	694,866	592,457	8,217	4,560	1,300,100	
	Dense pole	2,346	4	777	58,878	27,368	429		86,675	
	Open mature	19,620	3,510	15,945	1,870,712	956,547	18,729	3	2,845,991	
	Dense mature	1,378	202	669	69,636	8,932	756		79,324	
	Brush	2,871		3,707	242,032	576,144	879	191	819,246	
	All upland	50,885	7,034	45,548	4,340,340	3,078,516	124,349	6,084	7,549,289	
	Stream (hand)	2,833	330	10,777	1,552,011	70,040	577,636	12,587	2,212,274	
	Stream (slash)	23		487						
	Stream (machine)	158		697						798
	All stream	3,014	330	11,961	1,552,011	70,040	577,636	12,587	2,212,274	
	All types	53,899	7,364	57,509	5,892,351	3,148,556	701,985	18,671	9,761,563	

In working units 3 and 8, 9,222 acres that had been logged were covered by Ribes eradication crews.

Annual Report 1933
W. G. Guernsey

CHECKING RIBES ERADICATION WORK, 1933
COEUR D'ALENE NATIONAL FOREST

By
H. E. Swanson, Agent
A. L. Pence, Agent

The checking work was outlined to give the Ribes eradication forces immediate and detailed information on the amount and distribution of Ribes on the control areas both in advance of the crews and following crew work to facilitate progress and to insure efficient work.

The organization consisted of a checking supervisor, an assistant supervisor, 5 checker foremen and 20 checkers in the regular camps, and 6 checker foremen and 20 checkers in the ECW camps.

Seventy per cent of the time of these men was spent on checking work and the remaining thirty per cent was spent on activities directly connected with Ribes eradication work, which included such activities as training men, supervising crews in the field, reworking areas, and special assistance to the camp boss.

On the basis of advance checking on 22,287 acres, 13,807 acres were eliminated from crew work as being low in Ribes population.

The following tables are given showing the results of the checking work:

Table No. 1. Final checking Report on Blister Rust Control Areas, Regular and NIRA Camps, Coeur d'Alene National Forest, 1933.

Table No. 2. Classification of Blister Rust Control Areas by Feet of Live Stem per Acre by Eradication Types Following Ribes Eradication, Regular and NIRA Camps, Coeur d'Alene National Forest, 1933.

Table No. 3. Final Checking Report on Blister Rust Control Areas, ECW Camps, Coeur d'Alene National Forest, 1933.

Table No. 4. Classification of Blister Rust Control Areas by Feet of Live Stem per Acre by Eradication Types Following Ribes Eradication, ECW Camps, Coeur d'Alene National Forest, 1933.

Note: Tables No. 2 and 4 represent a classification of the area by 2.5 acre units on the basis of a 4 per cent sample check.

TABLE NO. 1

FINAL CHECKING REPORT ON BLISTER RUST CONTROL AREAS, REGULAR AND NIRA CAMPS
COEUR D'ALENE NATIONAL FOREST, 1933

Work-ing Unit Num-ber	Eradication Type	Worked Area			Advance Check Area				Total Acres Repor-ted	Worked Area Ribes Per Acre									Acres Eliminated On Basis of Advance Check Ribes Per Acre					
		Number Acres Worked	Number Acres Checked	Per-cent Check	Num-ber Acres in Area	Number Acres Elimi-nated From Crew Work	Number Acres Checked	Per-cent Check		Ribes la-custre		Ribes visco-sissimum		Ribes inerme		All Species		Seed-lings	Ribes la-custre		Ribes visco-sissimum		All Species	
										Bu.	L. S.	Bu.	L. S.	Bu.	L. S.	Bu.	L. S.		Bu.	L. S.	Bu.	L. S.	Bu.	L. S.
1	Dense reproduction	493	15.8	3.2					493	1	5	1	1			2	6							
	Open pole	3,275	117.7	3.6		1,637	61.7	3.8	4,912	1	8	2	7			3	15		2	6	1	6	2	12
	Dense pole	797	29.1	3.7		76	3.6	4.7	873	2	6					2	6		1	7	1	3	3	10
	Open mature	1,168	41.8	3.6		583	22.0	3.8	1,751	2	8	1	3			3	11		5	9	1	5	6	14
	Brush	123	4.4	3.6					123	1	3	7	25			8	28							
	All upland	5,856	208.8	3.6	3,331				8,152	2	7	1	5			3	12							
	Stream	161	27.3	1.7					161	9	27	1	1			9	28							
	All types	6,017	236.1		3,331	2,296	87.3	3.8	8,313	2	10	1	5			4	15		2	7	1	6	3	13
3	Open reproduction	2,311	86.4	3.8		90	3.6	4.0	2,401	2	9	2	10			5	19	1			1	10	1	10
	Dense reproduction	978	34.6	3.6		154	6.0	3.9	1,132	2	9	1	1			2	10		1	7			1	7
	Open pole	1,488	60.0	4.0		28	1.0	3.6	1,516	2	7	1	1			3	8	9						
	Dense pole	905	34.8	3.9		48	2.1	4.4	953	1	2	1	4	1	1	1	7	1	9	36			9	36
	Open mature	11,186	401.1	3.6		519	20.2	3.9	11,705	3	13	1	4	1	1	4	18	1	1	3			1	3
	Dense mature	532	19.2	3.6					532	1	4					1	4							
	Brush	92	3.4	3.7					92	5	16	16	52			21	68							
	All upland	17,492	639.5	3.7	2,441				18,331	3	11	1	5	1	1	4	17	1						
	Stream	1,072	89.9	8.4					1,072	5	12			1	1	5	13	2						
	All types	18,564	729.4		2,441	839	32.9	3.9	19,403	3	11	1	4	1	1	4	16	1	1	5	1	1	1	6
7	Open reproduction	147	5.5	3.8					147	1	1	5	16			6	17							
	Open mature	2,447	108.3	4.4		972	38.5	4.0	3,419	2	10	1	3			3	13		3	22	1	4	4	26
	Dense mature	740	29.1	3.9					740	2	7					2	7							
	All upland	3,334	142.9	4.3	1,066				4,306	2	9	1	3			3	12							
	Stream	107	20.9	19.5					107	4	10					4	10							
	All types	3,441	163.8		1,066	972	38.5	4.0	4,413	3	9	1	2			4	11		3	22	1	4	4	26
8	Dense reproduction	48	2.1	4.4					48															
	Open pole	483	17.7	3.7					483	5	20	1	5			6	25							
	Dense pole	250	11.7	4.7					250	5	14	1	1			6	15							
	Open mature	5,133	241.4	4.7					5,133	2	7	1	4			3	11							
	Dense mature	171	7.3	4.3					171	1	5	1	1			1	6							
	Brush	233	8.9	3.8					233	2	4	5	26			7	30							
	All upland	6,318	289.1		588				6,318	2	8	1	5			3	13							
	Stream	286	32.1	11.2					286	10	23	1	1	1	3	11	27							
	All types	6,604	321.2	4.9	558				6,604	3	10	1	5	1	1	4	16							

Data secured on 4 percent sample check.

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TABLE NO. 2

CLASSIFICATION OF BLISTER RUST CONTROL AREAS BY FEET OF LIVE STEM PER ACRE
BY ERADICATION TYPES FOLLOWING RIBES ERADICATION, REGULAR AND NIRA CAMPS
COEUR D'ALENE NATIONAL FOREST, 1933

Acreage and Percentage of Acreage Worked by Eradication Crews Falling Within Each Feet of Live Stem Per Acre Class by Eradication Types

Working Unit Number	Eradication Type	0 Feet Number Acres	0 Feet Per Cent of Total	1-25 Feet Number Acres	1-25 Feet Per Cent of Total	26-50 Feet Number Acres	26-50 Feet Per Cent of Total	51-100 Feet Number Acres	51-100 Feet Per Cent of Total	101-150 Feet Number Acres	101-150 Feet Per Cent of Total	151-300 Feet Number Acres	151-300 Feet Per Cent of Total	301-500 Feet Number Acres	301-500 Feet Per Cent of Total	501-1000 Feet Number Acres	501-1000 Feet Per Cent of Total	1001 and Over Feet Number Acres	1001 and Over Feet Per Cent of Total	Total Acres
1	Dense reproduction	457	92.8	13	2.6	8	1.6	12	2.4			3	0.6							493
	Open pole	2,801	85.6	100	3.0	155	4.7	107	3.3	43	1.3	50	1.5	13	0.4	3	0.1	3	0.1	3,279
	Dense pole	727	91.2	13	1.6	26	3.3	18	2.3	10	1.2	3	0.4							797
	Open mature	995	85.1	49	4.2	56	4.8	29	2.5	20	1.7	16	1.4	3	0.3					1,168
	Brush	73	59.4	10	8.1	22	17.9	15	12.2					3	2.4					123
	All upland	5,053	86.3	165	3.2	267	4.5	181	3.1	73	1.2	72	1.2	19	0.3	3	0.1	3	0.1	5,856
	Stream			69	42.8	74	46.0	18	11.2											161
	All types	5,053	83.9	254	4.2	341	5.7	199	3.3	73	1.2	72	1.2	19	0.3	3	0.1	3	0.1	6,017
3	Open reproduction	1,746	75.7	125	5.4	165	7.1	182	7.9	56	2.4	28	1.2	3	0.1	2	0.1	2	0.1	2,311
	Dense reproduction	828	84.7	32	3.3	40	4.1	46	4.7	18	1.8	6	0.6	6	0.6					976
	Open pole	1,272	85.6	103	6.9	57	3.8	31	2.1	11	0.7	11	0.7			3	0.2			1,488
	Dense pole	797	88.2	33	3.6	35	3.9	22	2.5	12	1.3	2	0.2	3	0.3					906
	Open mature	9,137	81.8	687	5.9	569	5.3	395	3.5	150	1.3	162	1.4	70	0.6	13	0.1	13	0.1	11,186
	Dense mature	472	88.7	25	4.7	27	5.1	5	0.9	3	0.6									532
	Brush	44	48.0	3	3.2	13	14.1	12	13.0	10	10.7	7	7.6	3	3.3					92
	All upland	14,298	81.7	978	5.6	926	5.3	694	4.0	260	1.5	216	1.2	87	0.5	18	0.1	15	0.1	17,492
	Stream			1,072	100.0															1,072
	All types	14,298	77.0	2,050	11.0	926	5.0	694	3.7	260	1.4	216	1.2	87	0.5	18	0.1	15	0.1	18,564
7	Open reproduction	64	43.6	29	19.7	43	29.2	11	7.5											147
	Open mature	2,091	85.5	167	6.8	106	4.3	38	1.5	21	0.9	24	1.0							2,447
	Dense mature	677	91.5	15	2.0	20	2.7	13	1.8	7	0.9	5	0.7			3	0.4			740
	All upland	2,832	85.0	211	6.3	169	5.1	62	1.8	28	0.6	29	0.9			3	0.1			3,334
	Stream			107	100.0															107
	All types	2,832	82.4	316	9.2	169	4.9	62	1.8	28	0.8	29	0.8			3	0.1			3,441
8	Dense reproduction	48	100.0																	48
	Open pole	357	73.9	25	5.2	29	6.0	25	5.2	21	4.3	18	3.7	8	1.7					483
	Dense pole	180	72.0	28	11.2	22	8.8	12	4.8			6	2.4	2	0.8					250
	Open mature	4,198	81.8	250	4.9	282	5.5	223	4.3	86	1.7	63	1.2	27	0.5	3	0.1			5,133
	Dense mature	160	93.7	3	1.7	5	2.9	3	1.7											171
	Brush	132	56.0	15	6.4	30	12.9	45	19.3	6	2.6	3	1.3	2	0.9					233
	All upland	5,075	80.3	321	5.1	369	5.8	308	4.9	113	1.8	90	1.4	39	0.6	3	0.1			6,318
	Stream			156	54.5	130	45.5													286
	All types	5,075	76.8	477	7.2	499	7.5	308	4.7	113	1.7	90	1.4	39	0.6	3	0.1			6,604
All Units	Open reproduction	1,812	73.6	154	6.3	208	8.5	193	7.9	56	2.3	28	1.1	3	0.1	2	0.1	2	0.1	2,458
	Dense reproduction	1,333	87.7	45	3.0	48	3.2	58	3.8	18	1.2	9	0.6	8	0.5					1,519
	Open pole	4,430	84.5	228	4.3	241	4.6	163	3.1	75	1.4	79	1.5	21	0.4	6	0.1	3	0.1	5,246
	Dense pole	1,704	87.2	74	3.8	83	4.3	53	2.7	22	1.1	11	0.6	5	0.3					1,952
	Open mature	16,421	82.4	1,123	5.6	1,034	5.2	685	3.4	277	1.4	265	1.3	100	0.5	16	0.1	13	0.1	19,934
	Dense mature	1,309	90.7	43	3.0	52	3.6	21	1.5	10	0.7	5	0.3			3	0.2			1,443
	Brush	249	55.5	28	6.3	65	14.5	72	16.1	16	3.6	10	2.2	8	1.8					448
	All upland	27,256	82.7	1,695	5.1	1,731	5.2	1,245	3.8	474	1.4	407	1.2	145	0.4	27	0.1	18	0.1	33,000
	Stream			1,404	86.4	204	12.5	18	1.1											1,626
	All types	27,256	78.7	3,099	8.9	1,935	5.6	1,263	3.6	474	1.4	407	1.2	145	0.4	27	0.1	18	0.1	34,626

Acreage and Percentage of Acreage Eliminated from Crew Work on Basis of Advance Check Falling Within Each Feet of Live Stem Per Acre Class by Eradication Types

Working Unit Number	Eradication Type	0 Feet Number Acres	0 Feet Per Cent of Total	1-25 Feet Number Acres	1-25 Feet Per Cent of Total	26-50 Feet Number Acres	26-50 Feet Per Cent of Total	51-100 Feet Number Acres	51-100 Feet Per Cent of Total	101-150 Feet Number Acres	101-150 Feet Per Cent of Total	151 and Over Feet Number Acres	151 and Over Feet Per Cent of Total	Total Acres
1	Dense reproduction													
	Open pole	1,497	91.5	15	0.9	37	2.3	33	2.0	15	0.9	40	2.4	1,637
	Dense pole	62	81.7	3	3.9	5	6.6	3	3.9			3	3.9	76
	Open mature	494	84.8	30	5.1	23	3.9	15	2.6	10	1.7	11	1.9	583
	Brush													
	All upland	2,053	89.5	48	2.1	65	2.8	51	2.2	25	1.1	54	2.3	2,296
	Stream													
	All types	2,053	89.5	48	2.1	65	2.8	51	2.2	25	1.1	54	2.3	2,296
3	Open reproduction	81	90.1	3	3.3	3	3.3			3	3.3			90
	Dense reproduction	138	89.7	3	1.9	5	3.2	8	5.2					154
	Open pole	28	100.0											28
	Dense pole	30	62.5			8	16.7	5	10.4			5	10.4	48
	Open mature	513	98.8	3	0.6							3	0.6	519
	Dense mature													
	Brush													
	All upland	790	94.2	9	1.1	16	1.9	13	1.5	3	0.4	8	0.9	839
	Stream													
	All types	790	94.2	9	1.1	16	1.9	13	1.5	3	0.4	8	0.9	839
7	Open reproduction													
	Open mature	875	90.1	22	2.3	45	4.6	17	1.7	3	0.3	10	1.0	972
	Dense mature													
	All upland	875	90.1	22	2.3	45	4.6	17	1.7	3	0.3	10	1.0	972
	Stream													
	All types	875	90.1	22	2.3	45	4.6	17	1.7	3	0.3	10	1.0	972
8	Dense reproduction													
	Open pole													
	Dense pole													
	Open mature													
	Dense mature													
	Brush													
	All upland													
	Stream													
	All types													
All Units	Open reproduction	81	90.1	3	3.3	3	3.3			3	3.3			90
	Dense reproduction	138	89.7	3	1.9	5	3.2	8	5.2					154
	Open pole	1,525	91.6	15	0.9	37	2.2	33	2.0	15	0.9	40	2.4	1,665
	Dense pole	92	74.1	3	2.4	13	10.5	8	6.5			8	6.5	124
	Open mature	1,882	90.7	55	2.7	68	3.3	32	1.5	13	0.6	24	1.2	2,074
	Dense mature													
	Brush													
	All upland	3,718	90.4	79	1.9	126	3.1	81	2.0	31	0.8	72	1.6	4,107
	Stream													
	All types	3,718	90.4	79	1.9	126	3.1	81	2.0	31	0.8	72	1.6	4,107

Data secured on 4 percent sample check.

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A. L. Pence

TABLE NO. 3

FINAL CHECKING REPORT ON BLISTER RUST CONTROL AREAS, ECW CAMPS
COEUR D'ALENE NATIONAL FOREST, 1933

Working Unit Number	Eradication Type	Worked Area: Number Acres Worked	Worked Area: Number Acres Checked	Worked Area: Per-cent Check	Advance Check Area: Number Acres in Area	Advance Check Area: Number Acres Eliminated from Crew Work	Advance Check Area: Number Acres Checked	Advance Check Area: Per-cent Check	Total Acres Reported	Worked Area Ribes per Acre: R. lacustre Bu.	R. lacustre L.S.	R. viscosissimum Bu.	R. viscosissimum L.S.	R. inerme Bu.	R. inerme L.S.	All Species Bu.	All Species L.S.	Acres Eliminated on Basis of Advance Check Ribes per Acre: R. lacustre Bu.	R. lacustre L.S.	R. viscosissimum Bu.	R. viscosissimum L.S.	R. inerme Bu.	R. inerme L.S.	All Species Bu.	All Species L.S.
4	Open reproduction	1,656	60.3	3.6		1,420	56.8	4.0	3,078	2	18			1	9	3	27	4	25			1	3	5	28
	Dense reproduction	1,411	56.4	4.0					1,411	3	18	1	1	2	10	5	29								
	Open pole	301	12.0	4.0					301	2	20					2	20								
	Open mature	181	7.2	4.0		40	1.6	4.0	221	12	73					12	73	16	69					16	69
	Brush	96	3.8	4.0		356	14.2	4.0	452	2	10					2	10	7	66					7	66
	All upland	3,647	139.7	3.8	2,934	1,816	72.6	4.0	5,463	3	21	1	1	1	8	5	30	5	34			1	2	5	36
	Stream*	344							344																
	All types	3,991	139.7	3.8	2,934	1,816	72.6	4.0	5,807	3	21	1	1	1	8	5	30	5	34			1	2	5	36
7	Open reproduction	250	9.3	3.7		72	3.6	5.0	322	5	14	17	64			22	78								
	Open pole	349	16.1	4.6		911	35.6	3.9	1,260	5	16	18	53			22	69	1	5	1	6			1	11
	Brush	92	3.7	4.0		200	8.3	4.2	292	3	17	24	98			28	115			2	18			2	18
	All upland	691	29.1	4.2	1,636	1,183	47.5	4.0	1,874	5	15	18	62			23	77	1	4	1	8			1	12
	Stream	40	7.7	19.2					40	9	39	1	2			10	41								
	All types	731	36.8	5.0	1,636	1,183	47.5	4.0	1,914	6	20	15	49			20	69	1	4	1	8			1	12
13	Open reproduction	40	1.8	4.5		136	5.8	4.3	176	4	17	7	28			11	45	2	25	11	85			13	110
	Dense reproduction	6	.3	5.0		81	3.3	4.1	87									3	23	1	7			4	30
	Open pole	258	10.6	4.1		2,317	92.4	4.0	2,575	2	18	5	26			7	44	3	11	2	23			5	34
	Dense pole	80	2.7	3.4		819	31.3	3.8	899	5	27	1	1			5	28	2	15	1	10			3	25
	Brush					1,349	64.2	4.7	1,349									1	8	2	30	1	2	4	40
	All upland	384	15.4	4.0	6,249	4,702	197.0	4.2	5,086	3	17	4	19			7	36	2	11	3	25			4	36
	Stream	650	48.4	7.4					650	15	40					15	40								
	All types	1,034	63.8	6.2	6,249	4,702	197.0	4.2	5,736	12	34	1	5			13	39	2	11	3	25			4	36
15	Open reproduction	822	32.8	4.0					822	2	6	13	35			15	41								
	Dense reproduction	720	28.8	4.0		588	23.5	4.0	1,308	3	10	5	15	1	2	8	27	1	4	3	15	1	5	4	24
	Open pole	489	19.6	4.0		1,278	51.1	4.0	1,767	2	7	6	19			8	26	1	4	2	14			2	18
	Dense pole	46	1.8	3.9					46																
	Open mature	185	7.4	4.0					185	4	10	4	12			8	22								
	All upland	2,262	90.4	4.0	3,052	1,866	74.6	4.0	4,128	2	8	8	22	1	1	10	31	1	4	2	14	1	2	3	20
	Stream	465	40.3	8.7					465	5	19			3	13	7	32								
	All types	2,727	130.7	4.8	3,052	1,866	74.6	4.0	4,593	3	11	5	16	1	5	9	32	1	4	2	14	1	2	3	20
16	Open reproduction	467	18.1	3.9					467	3	6	7	18			9	24								
	Dense reproduction	366	13.3	3.6		116	5.0	4.3	482	1	2	4	9			5	11	1	5					1	5
	Open pole	514	20.6	4.0					514	1	6	2	9			4	15								
	Dense pole	56	2.3	4.1					56	3	14					3	14								
	Open mature	409	21.5	5.2		17	0.8	4.7	426	1	4	3	7			4	11								
	Brush	260	10.7	4.1					260	1	3	5	20			6	23								
	All upland	2,072	86.5	4.2	990	133	5.8	4.4	2,205	1	5	4	11			5	16	1	4					1	4
	Stream	33	15.6	47.0					33	6	10	1	2			7	12								
	All types	2,105	102.1	4.9	990	133	5.8	4.4	2,238	2	5	3	10			6	15	1	4					1	4

* Stream type in working unit 4 was worked only in scattered patches; therefore, an accurate check could not be taken.
Data secured on 4 percent sample check.

THE BLISTER RUST CONTROL PREERADICATION SURVEY
INLAND EMPIRE

By
C. C. Strong
Associate Forester

The application of blister rust control measures is dependent upon the quality and density of white pine stands and the degree to which such stands are solidly blocked. Working conditions, which is a quantitative phrase including such factors as: (1) amount and distribution of Ribes, (2) topography, (3) size, density and nature of ground cover, (4) age, size and density of timber stand, determine largely what will be the per acre cost of establishing blister rust control. Knowing the quality and quantity of white pine involved, and the probable cost of instituting and maintaining control, the decision as to whether or not such control should be undertaken can be intelligently made. Such is the service rendered by the preeradication survey.

Control work done in the past has been confined to white pine areas of high value. With a relatively small operation each year, there was ample time for supervisors to give their personal attention to the selection of areas. However, the rust is present and already doing damage. To counteract this, an attempt is being made to speed up control work to forestall heavy losses. The 1933 season brought a relatively large increase in the program and plans are already under way for a still larger operation in 1934. The result of these developments showed the necessity for complete information on the job at hand. The preeradication survey was decided upon to secure needed information.

The survey was financed largely from funds made available through the NIRA. The following set of instructions shows what information was sought and how the survey was conducted.

INSTRUCTIONS FOR PREERADICATION SURVEY
BLISTER RUST CONTROL

It is planned to conduct a survey on approximately two million acres of forest land in north Idaho, northeastern Washington and northwestern Montana, the bulk of which is classified as white pine type. The purpose of the survey is to secure information on which to base future blister rust control work. The immediate objects are as follows:

1. To determine what forest areas are white pine type.

2. To determine the forest type for areas surveyed which are not white pine type.

3. To determine the eradication type for all areas surveyed.

4. To determine the age class of all areas surveyed regardless of type.

5. To determine the degree of stocking in all types for all age classes.

6. To determine the Ribes eradication working class (light, medium, heavy and very heavy) for all white pine type and immediately surrounding areas.

7. To determine the location and extent of concentrations of Ribes inerme.

8. To determine the location and extent of R. petiolare and amount of chemical needed for treatment.

9. To determine possible camp sites, location of roads, pack trails and footways.

10. To determine blister rust infection conditions.

Detailed explanation of information desired and methods of securing it follows:

General. Parties of six men or more will constitute each preeradication party. Each party will include a chief and a cook. A full camp outfit will be carried. Each party will be provided with a $1\frac{1}{2}$-ton truck to transport camp outfit and supplies, 2 $\frac{1}{2}$-ton pickups and the requisite amount of technical equipment and supplies.

Camps will be set up at such points as will permit maximum use of existing roads to permit quick transportation between camp and points of field work. Camps will be moved as necessary, to comply with the above.

The chief of party will start his men in areas known to be largely white pine type and will spend sufficient time with each man to insure himself that the work is being done properly and that correct information is being accurately recorded. When this has been accomplished, his principal duties will be advance extensive inspections to plan work ahead, checking the work of individual recorders, and any actual surveying that time will permit.

By the time the survey is started oblique aerial photographs of all areas to be covered will be available. A set of photographs for the areas involved will be supplied each party.

The general method of covering areas by the recorder will be that used in 1932. The chief of party will assign such area to each man as he can complete the following day. The size of the area will vary with conditions. The governing factor will, at all times, be the amount of area estimated on which full and accurate information can be secured in one day, by one man. Cross-section paper will be used for field sheets. From the photographs and available maps each man will map his area in advance using a 4" scale. The recorders will be equipped with sheet-holder, compass, map, staff for setting at center of plots while counting reproduction or trees, pencils and recording paper.

The route of travel over an area will be determined on the ground by the recorder. It will vary with topography and forest cover and will, in most

cases, be a meandering one. It will be such a course as will permit of maximum use of observation points and thorough enough examination to permit accurate recording of information needed. The route traveled will be recorded on the field sheet. With the aid of the compass and knowledge of his general location, the recorder can, by shooting on points accurately mapped, determine his position within reasonable limits. Correct placing of boundaries and plots on the field sheet will be accomplished by judiciously following the above procedure.

Members of preeradication crews will be experienced in recognizing blister rust infection on either white pines or on Ribes leaves. While covering individual areas, an exceptionally good opportunity is afforded for locating pine infection areas not previously reported and for determining general Ribes infection conditions. At the time of year when the survey is made many Ribes leaves will have dried or dropped. However, many bushes in favorably located areas will have retained at least a portion of their leaves. Information on pine and Ribes infections should be reported on the field sheet and also given to the chief of party for transmission to the Spokane office periodically.

1 and 2. Determining what forest areas are white pine type and what are other types.

The recorder must rely largely upon his judgment in determining types. Certain general rules are prescribed which must be tempered with judgment. In the 0-20 age class 200 well distributed trees per acre will constitute white pine type. This standard must be considered as elastic. For instance, white pine ordinarily reproduces over a series of many years. Thus, an area burned over or cut over ten or fifteen years ago and now supporting 100 or 150 young white pine seedlings might reasonably be expected to support 200 or more such seedlings per acre in the near future. Again, an area supporting 25-50 well distributed 15 or 20-year-old white pines per acre on good white pine site having little of other species might be expected to be fairly well stocked to white pine from seed produced on these existing white pines within the next few years. In both cases the areas should be classified as white pine type. Hence, judgment must be relied upon in many cases.

In pole-sized timber, it may be assumed that each dominant tree will net 500 board feet when mature and that most of these trees will survive to maturity. A fairly well stocked stand of mixed pole which will yield 10,000 board feet of white pine per acre at maturity should be classed as white pine type. This means 20 white pine poles per acre.

Mature white pine type requires a minimum of 5,000 board feet per acre.

In classifying timbered areas not white pine, the type classification should be the predominating species or mixture such as lodgepole (L.P.), cedar-hemlock (C-H), Douglas fir-larch (D.F.-L.), yellow pine (Y.P.), larch (L), Douglas fir (F), subalpine (S.A.), nonreproducing burns, recent burn, and waste land.

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For all types other than white pine the definitions of type set up in "Standard Timber Types", a copy of which will be furnished each party, is to govern.

3. Determining the eradication type.

This is a matter which should not give any difficulty to preeradication field recorders because of their experience on a going Ribes eradication operation. The whole area covered should be classified. The eradication types which will be recognized are: open reproduction (OR), dense reproduction (DR), open pole (OP), dense pole (DP), open mature (OM), dense mature (DM), recent burn (B), recent cut-over (CO), and brush (Br.). Stream type will not appear as such on the map. It will be shown in symbols to be described later.

4. Age classes are to be determined on the ground by field recorders. The classes to be used include 20-year intervals up to 120 as follows: 0-20, 21-40, 41-60, 61-80, 81-100, 101-120. Three other classes, namely 121-160, 161-200 and 201 and up, are to be used.

The field recorder may experience some difficulty in classifying timber into these age groups. Probably the safest rule to follow will be counting the whorls on white pine and adding about five years. Where no white pines are present it will be necessary to throw the area into the same age class as some near-by one of the same apparent age where the recorder has been able to make a determination.

In timber over 80 year of age difficulty will be experienced in counting whorls. Since it will not be possible to equip recorders with increment borers, it will be necessary for them to rely upon their own judgment. Some suitable procedure will be worked out later which will be used as a guide.

5. Determining the density of stocking.

Regardless of age class or type, tree counts will be made frequently enough to insure accurate density determinations. These counts will be made on circular plots. In young growth where visibility is poor, circles of $26\frac{1}{2}$ feet radius or 53 feet diameter will be used. In older growth, circles of 37 feet radius or 74 feet diameter will be used. The former is 1/20th and the latter 1/10th of an acre in total area. Hence counts in the small circle would be multiplied by 20 to compute the number of trees per acre and those in the larger circle by ten.

In all cases a small circle on the field sheet, at the location where the count was made, is the proper legent to indicate a density plot. The number of white pines per acre should be entered inside the circle. In a similar manner the number of trees per acre of all other species (collectively, the number by species is not needed) should be shown.

Great care should be exercised at all times to make plots show average conditions. The recorder must guard against sampling only the best. His plots should be so laid as to cover all conditions of density. Plots must be taken at regular intervals on a course decided upon somewhat in advance in order to eliminate the personal factor. If, after having made

density studies on a given slope, age class or portion of his days' area, the recorder feels that the plots do not picture conditions accurately, explanatory notes should be made.

6-8 Determination of Ribes eradication working class, location and extent of R. inerme and R. petiolare concentrations and the amount of spray required for treating R. petiolare.

The location of R. inerme too heavy to be hand-pulled should be shown on the field sheet with a red line, the width of the line indicating the relative width of the R. inerme concentration. R. petiolare too heavy to be hand-pulled is to be indicated with a brown line in a similar manner. Notes on the field sheet must show the acreages of each on the area assigned and the number of gallons of spray required to treat R. petiolare.

All areas covered, upland and stream bottoms, are to be classified by working classes. For this purpose four classes are to be recognized, namely, light, medium, heavy and very heavy. In this determination factors such as Ribes abundance and size, brush and timber cover, steepness of slope, debris, etc., should be taken into consideration. On upland areas simply placing the proper symbol, l, m, h or v.h., on the field sheet is the proper method of designating classes. Stream type should be disignated by l, m, h or v.h, together with the average width in chains as follows:

1-1/2h   1m

9. Camp locations, roads, trails, etc.

Recorders are required to place accurately on the map any road passable by trucks, and trails not already shown on existing maps. Ordinarily this would not be necessary but so many forest roads are under construction at the pesent time that it is advisable to record them together with any which are expected to be finished in the near future.

It is especially important that properly located camp sites be selected. Hence strategic locations which can be reached with truck or pack animals should be examined. If the site is unsatisfactory for a camp then a satisfactory one as near as possible to the desired one should be selected and located on the field sheet. It will be well also to select a few other satisfactory sites in case unforeseen circumstances necessitate changes in plans.

Maps. Each chief of party will keep up to date on 2"-scale township plots the following:

1. Type map. This map will show forest types in color, solid for merchantable and dotted for timber not now merchantable. The Forest Service Standard Color Legend will be used. Land without timber is to have the classification written in.

2. Age class map. Simply writing in the age class with boundaries between age classes indicated, is all that is required.

Streams should be shown on both maps.

Field sheets. A properly executed field sheet will be furnished each party so that field recorders will at all times agree in legend and infomation not shown by legend.

RESULTS

Due to heavy snows, it was necessary to discontinue the survey on the Kaniksu, Pend Oreille, Kootenai and Cabinet National Forests late in October. Although one party was moved to lower elevations, it was possible to continue with the survey on the St. Joe and Clearwater areas till early in November.

The following table shows the area covered by forest regions and the cost of the work:

RESULTS OF PREERADICATION SURVEY

Location	Acreage Surveyed			Cost of Survey	
	White Pine Type	Other	Total	Total	Per Acre
Cabinet National Forest	27,650	43,530	71,180	$981.83	$0.0138
Kootenai " "	19,205	54,975	74,180	1,199.27	0.0162
Pend Oreille " "	74,610	126,060	200,670	2,699.85	0.0134
Kaniksu " "	62,220	56,600	118,820	2,007.50	0.0169
Coeur d'Alene " "	8,350	31,650	40,000	-	-
St. Joe " "	246,975	269,770	516,745	4,448.65	0.0086
Potlatch T.P.A.	49,900	64,780	114,680	1,032.09	0.0090
Clearwater T.P.A.	39,600	6,910	46,510	692.49	0.0149
Pend Oreille County, Wn.	3,950	35,000	38,950	659.04	0.0169
Totals	532,460	689,275	1,221,735	$13,720.72	$0.0120

The Coeur d'Alene acreage (40,000) is not included in computing the average cost per acre for the survey.

SCOUTING FOR BLISTER RUST IN THE INLAND EMPIRE, 1933

By
Leiton E. Nelson
Agent

INTRODUCTION

Although no scouting program was organized for the Inland Empire in 1933, members of the various project scouted for the rust in the main white pine region during the course of their regular work. In addition, a few days were spent by members of the Disease Study Project scouting in the Seven Devils Mountains of west-central Idaho, and around Brundage Mountain in the vicinity of McCall, Idaho.

PURPOSE

The purpose of all scouting is to determine the extent of rust spread. The specific purpose of the work in the Seven Devils Mountains was to determine whether or not there had been southward spread of rust from the heavier infections within the main body of white pine. Also, since the Seven Devils Mountains are along the Snake River, which is a tributary of the Columbia River, there was an opportunity to check on the merits of the theory advanced, that the initial rust spread to the Inland Empire was up the Columbia River and its tributaries.

RESULTS

Prior to 1933, 77 pine infection centers had been found in the Inland Empire. Of this number 12 originated about 1923, which is considered the year the disease was introduced into this region. In 1933, 13 new pine infection centers were reported, one of which originated about 1923. These bring the total known centers in this region to 90, and the total old or original centers to 13.

In addition to the pine infection centers, Ribes infection was reported at 11 new locations. These points, although not adjacent to pine infections, are all within the regions in which occur most of the known pine infection centers.

Table No. 1 shows for each forest unit the number of Ribes infection and pine infection locations found in 1933, and the total pine infections found to date.

TABLE NO. 1

NUMBER OF INFECTIONS FOUND IN 1933 AND TOTAL NUMBER OF KNOWN PINE INFECTIONS ON EACH FOREST UNIT

Forest Unit	Infections Found 1933		Total Known Pine Infections
	Pine	Ribes	
Coeur d'Alene National Forest	1	2	8
Private land, Newman Lake, Washington			1
St. Joe National Forest	2		36
Private land adjacent to St. Joe National Forest			1
Potlatch Timber Protective Association	3	1	16
Clearwater Timber Protective Association	6	5	21
Clearwater National Forest	1	3	7
All Areas	13	11	90

Tables No. 2 and 3 show the location of each new pine infection and Ribes infection found in 1933.

TABLE NO. 2

Pine Infections				
County	Location	T.	R.	Sec.
Clearwater Timber Protective Association				
Clearwater	Weaver Creek	35N	5E	1,2,11, 12
	S. Fk. Reed's Creek	38N	5E	23
	S. Fk. Deer Cr	38N	5E	13
	Washington Cr.	38N	6E	15
	Noname Creek	40N	6E	26
	Cow Creek	36N	4E	3
Clearwater National Forest				
Clearwater	French Creek	37N	7E	6,7,18, 19
Potlatch Timber Protective Association				
Clearwater	Elk Creek	40N	2E	11
	E. Fk. Potlatch Creek	41N	1E	25
	Deep Creek	40N	3E	31
St. Joe National Forest				
Shoshone	Mazie Creek	42N	1E	14
	Mazie Creek	42N	1E	24
Coeur d'Alene National Forest				
Kootenai	Bottom Creek	51N	2W	11

TABLE NO. 3

Ribes Infection				
County	Location	T.	R.	Sec.
Clearwater Timber Protective Association				
Clearwater	Meadow Creek	38N	4E	11
	Meadow Creek Orofino Creek	37N	5E	32
	S. Fk. Big Cr	38N	4E	3
	Cash Creek	38N	7E	31
	Orofino Creek	36N	5E	12 and13
Clearwater National Forest				
Idaho	Mussellshell R. S.	35N	6E	17
Clearwater	Head of Oro-grande Creek	38N	7E	23 and 26
	Orogrande Cr.	38N	7E	25,26,34, 35
Potlatch Timber Protective Association				
Clearwater	Elk Creek	41N	2E	24
Coeur d'Alene National Forest				
Shoshone	Eagle Creek	50N	4E	24,26,34
	Eagle Creek	50N	4E	23

No rust was found in the Seven Devils Mountain or around Brundage Mountain. However, excellent host associations were noted. The best of these are in the Seven Devils Mountains where *Ribes petiolare*, *R. lacustre* and *R. viscosissimum* occur with *Pinus monticola* and *R. montigenum* with *P. albicaulis*.

Table No. 3 shows the number of host plants examined in these areas.

TABLE NO. 4

NUMBER OF RIBES AND PINES EXAMINED, SEVEN DEVILS AND BRUNDAGE MOUNTAINS, WEST CENTRAL IDAHO, 1933

Host Species	Regions: Seven Devils Mountains	Brundage Mountains	Both
Ribes			
R. cereum	100		100
R. niveum	100		100
R. viscosissimum	50	25	75
R. lacustre	20		20
R. montigenum	50	10	60
R. velutinum	1		1
R. petiolare	500		500
All Ribes	821	35	856
Pines			
P. monticola	100		100
P. albicaulis	200	50	250
All Pines	300	50	350

ANALYSIS OF COSTS
SCOUTING PROJECT 4.12
1933

Salaries.............$283.70
Subsistence............ 63.25
Transportation......... 3.63
Total. $350.58

BLISTER RUST CONTROL WORK IN WASHINGTON
1933

Work in Washington consisted of continuance of local control operations in Mount Rainier National Park, scouting for the disease in various parts of the state, and as usual the maintenance of the Western field office in Spokane. No special memorandum of understanding was executed with any state or private agencies to cover this work. Despite this fact, the customary cooperative relations were maintained with the Washington State Department of Agriculture.

BLISTER RUST CONTROL ACTIVITIES, MOUNT RAINIER NATIONAL PARK

By
Harry F. Geil
Agent

INTRODUCTION

Blister rust control work during the season of 1933 consisted of Ribes reeradication on the White River area, initial Ribes eradication on the Muddy Fork Cowlitz area, checking the efficiency of the work and scouting for blister rust cankers to determine the spread and intensification of the rust.

The Division of Blister Rust Control supplied the general supervision, and the National Park Service furnished four experienced blister rust men for camp foremen. All labor was performed by men detailed from ECW camps.

RIBES ERADICATION

Purpose of the Work:

The purpose of the work was to rework some areas to give greater protection to that area, and to extend protection by working additional adjoining areas.

Location and Description of Areas:

Ribes reeradication was performed on about 465 acres of the White River area. The initial Ribes eradication was done on approximately 27 acres on the Muddy Fork Cowlitz area in the vicinity of Maple Creek.

The area worked at Maple Creek was almost one solid mass of *Ribes bracteosum* mixed with devil's club, alder and willow. Infection was present on both Ribes and pines.

The White River area consisted of stream type that is heavily timbered with stands of dense mature timber. Working conditions were favorable as there was very little brush. *Ribes lacustre* and *R. viscosissimum* were the principal Ribes species found.

Methods and Equipment:

All Ribes eradication was by the hand-pulling method. Both the three and five-man crews were used. It was necessary to use five-man crews because there were not enough experienced or competent men for crew leaders.

Result of Work:

The following table gives the result of all initial Ribes eradication for the field season of 1933:

TABLE NO. 1

RIBES ERADICATION SUMMARY, MOUNT RAINIER NATIONAL PARK
1933

Area	Type	Acres	Man Days	Ribes Pulled				Acreage Basis	
				R.brac.	R. lac.	R.lax.	Total	Ribes	Man Days
Maple Creek	Str.	27.1	546	22.676	147	576	23.399	863.4	20.1

The following table gives the results of all Ribes reeradication for the field season of 1933:

TABLE NO. 2

RIBES REERADICATION SUMMARY, MOUNT RAINIER NATIONAL PARK
1933

Area	Type	Acres	Man Days	Ribes Pulled						Acreage Basis	
				R. brac.	R.lac.	R. lax.	R. vis.	R. sang.	Total	Ribes	Man Days
White River	Str	465	688	127	38,265	5	571	11	38,870	83.6	1.48

SCOUTING

Random scouting on Stevens Creek from Lake Louise to the Muddy Fork Cowlitz River, and on the Muddy Fork Cowlitz from Cowlitz Glacier for a distance of one mile south of the National Park boundary showed Ribes, Ribes infection, and white pine infection to be generally distributed over those areas.

BLISTER RUST CONTROL WORK IN OREGON
1933

Blister rust control activities in Oregon were continued as a cooperative project between the Bureau of Plant Industry and the Bureau of Plant Industry of the State Department of Agriculture, the Oregon State Board of Forestry, and the Department of Plant Pathology of the Oregon State College. There is given below the amendment to the basic memorandum of understanding, which was drawn up to cover the cooperative work for the fiscal year 1934, beginning July 1, 1933.

AMMENDMENT TO MEMORANDUM OF UNDERSTANDING Effective July 1, 1927 Between

Amendment No. 6
Spokane, Wash.

THE UNITED STATES DEPARTMENT OF AGRICULTURE, BUREAU OF PLANT INDUSTRY, THE OREGON STATE BOARD OF HORTICULTURE, OREGON STATE BOARD OF FORESTRY, AND THE OREGON STATE COLLEGE

Cooperative work in controlling White Pine Blister Rust in Oregon

* * *

The undersigned mutually agree that the memorandum of understanding between the United States Department of Agriculture, Bureau of Plant Industry and the Oregon State Board of Horticulture, Oregon State Board of Forestry and the Oregon State College effective July 1, 1927 to continue in effect until June 30, 1923, shall be continued in full force and effect in all its provisions for the fiscal year ending June 30, 1934 with the exception of Paragraphs E-1 and E-6 which shall be amended to read as follows:

E-1. That this memorandum of understanding shall take effect July 1, 1933 and continue in effect until June 30, 1934, provided that either party may terminate the agreement at any time by a written statement to that effect 30 days in advance of the date of termination desired.

E-6. That for the fiscal year July 1, 1933 to June 30, 1934 the Oregon State Board of Horticulture will expend about \$2,500.00; the Oregon State Board of Forestry will expend about \$1,000.00; the Oregon State College will expend about \$1,750.00; and the Federal Government in behalf of the United States Department of Agriculture, Bureau of Plant Industry about \$2,500.00 in connection with the work herein provided for.

March 26, 1934 — Chas. A. Cole
Director, Bureau of Plant Industry, State Department of Agriculture (succeeding State Board of Horticulture).

March 26, 1934 — Lynn F. Cronemiller
State Forester, Oregon State Board of Forestry.

March 27, 1934 — C. E. Owens
Plant Pathologist, Oregon State College.

April 9, 1934 — K. F. Kellerman
Chief, Bureau of Plant Industry, U.S.D.A.

SCOUTING FOR WHITE PINE BLISTER RUST IN OREGON

By

L. N. Goodding

Associate Pathologist

The scouting work in this state was extensive and done mostly by the writer. Before the scouting campaign was started in California, the scouting organization under E. L. Joy, Junior Forester, worked in the Baker region of northeastern Oregon. Later in the season they scouted in the Warner mountains of south central Oregon near Lakeview. George Root, Associate Pathologist, scouted near the highway from Keno to Ashland and south. H. G. Lachmund, Pathologist of the Division of Forest Pathology, worked in the John Day region near Austin.

Some locations where rust was found on Ribes last year were examined early in the season for pine infections. Scouting was extended from these centers, which resulted in the discovery of infected pines on Lost Creek near the McKenzie Highway. No pine infections were found on either the South Fork of the McKenzie River beyond Frissel Crossing or on the Middle Fork of the Willamette River, including Deception, Bridge, Duval and Big Fall Creeks.

Drainages closely related to infected areas were carefully scouted in an attempt to follow the spread of the rust. No rust was located in the upper Umpqua and upper Rogue River drainages. Blister rust had been found for three seasons in the Metolius region. This suggested that it might have drifted across the Cascade Mountains in other places. Many concentrations of uninfected Ribes petiolare, not associated with pine, were found along Tumalo Creek west of Bend. Abundant blister rust was found on Ribes within a short distance of sugar pine on the Deschutes River below Lava Lake. Uninfected R. petiolare with no pine in association was found on Maklax Creek two miles north of Odell Lake.

Two days were spent scouting concentrations of R. petiolare along streams in the vicinity of Lakeview. No blister rust was found there.

Scouting down the coast failed to show any advance of the rust. The disease was found on several R. bracteosum bushes on Ten Mile Creek below Yachats, and seven miles north of Marshfield at an old site. None was found at Humbug Mountain in Curry County. From this, one may assume that if blister rust has become established on pines in southwestern Oregon, it has not yet reached the stage of intensification necessary to spread it generally.

A study of the topography of the country between the Cascade and Coast ranges makes it seem doubtful that the spread of the rust will be rapid directly south beyond the Willamette drainage. By examining the passes one should be able to locate the rust as it advances. This is based on the assumption that air currents carrying viable spores are, for the most part, those definitely influenced in direction by mountain ranges and valleys. This seems reasonable from a study of infection centers in the West. The topography indicates that the rust could readily spread up the valleys and strike in such drainages as the Clackamas, the Santiam, the McKenzie and the Willamette. Pine infections have been found in each of these drainages; the Bohemia Mountain infection being in the Willamette drainage.

The significance of the Bohemia Mountain infection must be evident to anyone studying the topography of this region. Prior to the present time the rust must have passed into the Umpqua River drainage from which, sooner or later, it will drift over the divide and into the excellent white and sugar pine at the head of the Rogue River. This seems like the plausible direction of spread. The pass south of Cannonville offers an excellent site for an inspection point with abundant R. bracteosum, but no good pine association. Below this point it is hard to conjecture where rust would be likely to strike. Low passes in the mountains seem to offer the best chance. The extremely dry conditions about Grants Pass and thru to Medford and Ashland make the appearance of blister rust in that region unlikely. The high Siskiyous, however, are favorable in himidity, Ribes and pines. No site located seems better than north of the pass on the California line on the Grants Pass-Crescent City highway. There, R. bracteosum and sugar pine are abundant. This point has been made the site of repeated and careful scouting.

Scouting along the coast, except from Marshfield southward, has seemed unlikely to show significant results. The only logical conclusion to be drawn from coast point infections is that they were due to winds paralleling the coast, and being drawn into the valleys by sea breezes. The Pinus strobus in association with R. bracteosum at Sumner, near Marshfield, has been watched for years. No rust has yet appeared there. The past season the farthest point south blister rust could be located was about seven miles north of Marshfield. It seems unlikely that the absence of the rust at Humbug Mountain this year or last year bears any particular significance, except to indicate that there is no nearby pine infection old enough to be sporulating.

Scouting in the Blue and Wallowa Mountains was of very short duration due to the necessity for organization of the California scouting project. The three days in this region were consumed in scouting as follows:

1. Antone Creek, a tributary of the North Powder River, to Anthony Lake. Anthony Lake is about 16 miles southwest of the town of North Powder. It is of interest to note that this lake is about 30 miles northeast of Austin, near which town H. G. Lachmund, found blister rust on Ribes.

Although most of the trip up Antone Creek is through yellow and lodgepole pine and white fir timber, R. petiolare occurs in scattered clumps along the stream. From approximately 6,000 to 6,500 feet elevation, R. petiolare is associated with P. albicaulis. Above 6,500 feet no R. petiolare and only occasional R. lacustre and R. montigenum were found with the pine.

2. Weston to Elgin through the Blue Mountains. Although the occurrence of western white pine in association with R. petiolare is known to exist in the Blue Mountains, both to the north and to the south of the Weston-Elgin road, this trip disclosed a very dry yellow pine type, which yielded very poor scouting.

3. Lostine River and Lakes Basin near Lostine, Oregon. From Lostine, a road follows the river for 17 miles, ending about two miles below the lower end of the Lakes Basin, which is a mountain meadow four miles long. Most of the area from Lostine to the Lakes Basin supports a scattered stand of R. lacustre. Clumps of R. petiolare and occasional white pine were seen along the last five miles of road.

Through the basin, which ends at Mirror Lake in the low divide between the Lostine and Wallowa River drainages, moderately abundant P. albicaulis was noted. An occasional R. montigenum was the only associated Ribes found.

Two days were spent in the vicinity of Sourdough Ranger Station, which is located on the North Fork of Smith River. Exceptionally poor scouting was encountered in this vicinity because of the scarcity of Ribes on the dry, rocky slopes and along the rocky streams. A few R. cruentum and R. sanguineum were found associated with scattered sugar and western white pine.

Along the Winchuck River and its tributaries, which are influenced by the coastal moisture, an abundance of Ribes, chiefly R. bracteosum, provide excellent scouting. However, the absence of associated pines prevents the establishment of rust centers. Two days were spent scouting in this drainage.

Extending for approximately 30 miles in Oregon and 60 in California, the Warner Mountains with both P. albicaulis and P. monticola in association with R. viscosissimum, R. montigenum, R. cereum, R. inerme and R. petiolare, offer one of the best possibilities for rust entrance into California. The occurrence of the associated hosts in the mountains northwest of the Warner Range adds to the possibility of spread from the Cascades by way of this route.

Because of heavy Ribes defoliation from both frost and grazing, only three days were devoted to scouting in the Oregon portion of this range. Further scouting in this region and in the mountains to the northwest should be included in the 1934 program.

The following tables are self-explanatory.

TABLE NO. 1

BLISTER RUST INFECTIONS ON RIBES IN OREGON
1933

	Locality Willamette Meridian	Species	Number of Bushes Examined	Number of Bushes Infected	Pine Association	Remarks	Inspector	Date
Lane	South Fork McKenzie River Sec. 21, T.17S, R.5E.	R.bracteosum	5	2	None	Light	Goodding	June 30
Coos	7 miles north of Marshfield, Ore. Sec. 36, T.24 S., R.13W.	R.bracteosum	50	1	None	Very light	Goodding	September 12
Deschutes	Head of Deschutes River, Oregon Sec. 27, T.19S., R.8E.	R. petiolare R. inerme	200 20	25 2	P.lambert. about 200 yards	Heavy light	Goodding	September 18
Grant	Near Head of John Day River Sec. 7, T.15S., R.35E.	R. petiolare	60	2	None		Lachmund	August 14
Grant	Near Austin Sec. 21, T.11S., R.35E.	R. petiolare	30	2	None		Lachmund	August 6
Grant	Tributary of Lunch Creek Sec. 30, T.12S., R.35E.	R. petiolare	50	1	Good	On one leaf only	Lachmund	August 8
Lane	Ten-Mile Creek Sec. 35, T.15S., R.12W.	R.bracteosum			None		W.Wheeler	September
"	Bohemia Mountain, Champion Creek Sec. 24, T.22S., R.1E.	R.bracteosum	10	2	None		Goodding	October 18
"	Bohemia Mountain, Champion Creek Sec. 36, T.22S., R.1E.	R.bracteosum	25	1	Excellent	Light	Goodding	October 18
"	Bohemia Mountain, Champion Creek Sec. 35, T.22S., R.1E.	R. sanguineum	50	1	Excellent	Rather heavy	Goodding	October 18
"	Bohemia Mountain, Sharps Creek Sec. 8, T.23 S., R.1E.	R.bracteosum	5	1	Very Poor	Very light	Goodding	October 19
	Corvallis, Oregon	R.petiolare R.sanguineum	15 10	5 2	None	Medium	Goodding	October

TABLE NO. 2

BLISTER RUST INFECTIONS ON PINUS MONTICOLA IN OREGON 1933

Locality Willamette Meridian	Date	Age of Pines	Abundance	Number of Pines Exam.	Number of Pines Inf.	Probable Year of Infection	Associated Ribes
Lost Creek, Lane County, Sec.19,T.16S. R.7E.	May 4	5-100 Years	Scattering	30	3	1930	R.bracteosum
Battle Axe, Marion County, Sec. 14 & 23, T.8S., R.5E.	July 5 and 6	14 years	Abundant (planted)	200	10	1925	R. lacustre R.bracteosum
Bohemia Mountain, Lane County, Sec. 1, T.23 S., R.1E.	October 18	20 years	Abundant	25	3	1927	R.bracteosum R.sanguineum R.lacustre

With reference to Table No. 3, the following points are worthy of mention because of excellent association of Ribes and pines, or because Ribes occur in what appear to be especially favorable sites in relation to winds. Ribes were examined in scores of places where conditions are so unfavorable or where Ribes were so universally present as to make the establishment of inspection points quite superfluous. Ribes at the points mentioned were inspected one or more times during the season.

TABLE NO. 3

INSPECTION POINTS OTHER THAN THOSE WHERE INFECTION WAS FOUND IN OREGON
1933

County	Drainage	Location Willamette Meridian	Ribes Species	Association	Inspector
Curry	Humbug Mountain	Sec.25, T.33S., R.15W.	R.bracteosum	None	Goodding
	Arizona Inn	Sec.20, T.34S., R.14W	R.bracteosum	None	Goodding
	Gold Beach	Sec.29, T.36S., R.14W.	R.bracteosum	None	Goodding
	Brookings	Sec.30,31,T.40 S.,R.13W.	R.bracteosum	None	Goodding
Deschutes	Maklax Creek	Sec.20,T.23S., R.7E.	R.petiolare	None	Goodding
	Odell Lake	Sec.25, T.23S., R.6E.	R.cereum,R.lacustre R.hallii,R.sangui-neum	Excellent	Goodding
	Tumalo	Sec.26,34,T.7S.,R.11E.	R.petiolare	None	Goodding
Douglas	Umpqua	Sec.10, T.26S., R.6W.	R.cereum, R.klamathense	None	Goodding
	Canyon Creek	Sec. 11,23,T.31 S.,R.5W.	R.bracteosum	None	Goodding
	West Fork	Sec.32,33,T.28 S.,R.4E.	R.bracteosum	Exc.,P.lambert and P.mont.	Goodding
	Susan Creek	Sec.11,T.26S., R.2W.	R.bracteosum	Good	Goodding
	Fairview Creek	Sec.4, T.26S., R.1W.	R.bracteosum	Good	Goodding
	Steamboat River	Sec.6, T.26S., R.1W.	R.sanguineum	Good	Goodding
	Thielson Creek	Sec.6, T.27S., R.6E.	R.lacustre	Good	Goodding and Wessela
	Clearwater Creek	Sec. 1, T.27 S., R.5E.	R.lacustre, R.cerem	Good	Goodding and Wessela
	North Umpqua	Sec.35,T.26S., R.3E.	R.lacustre,R.cereum	Good	Goodding and Wessela
	Fish Creek	Sec.8, T.28S., R.4E.	R.lacustre,R.cereum	Good	Goodding and Wessela
	Elk Creek	Sec.29,T.31S., R.1W.	R.sang.,R.lacustre	Poor	Goodding
	Elk Creek	Sec.19,T.32S., R.1W.	R.sanguineum	Good	Goodding
	Mill Creek	Sec.35,T.22S., R.10W.	R.sanguineum	None	Goodding
Jackson	Foster Creek	Sec.14,T.29S., R.3E.	R.bracteosum,R.tris-te,R.binominatum		
	Hershberger	Sec.36,T.29S., R.3E.	R.bracteosum,R.tris-te,R.binominatum	Excellent	Goodding
	Burnt Creek	Sec.20,T.39S., R.3E.	R.inerme	None	G. A. Root

TABLE NO. 3 (continued)

County	Drainage	Location Willamette Meridian	Ribes Species	Association	In-spector
Jackson	Cottonwood Creek	Sec. 6, T.41 S., R.2 E.	R.inerme, R.velutinum	Very poor	G.A.Root
	Keene Creek	Sec.29, T.39 S., R.3 E.	R.sanguineum	None	G.A.Root
	Jenny Creek	Sec. 4, T.40 S., R.4E.	R.inerme	None	G.A.Root
	Emigrant Creek	Sec.33, T.40S., R.2E.	R.lobbii, R.sanguineum	P.Mont. good	G.A.Root
Jefferson	Suttle Lake	Sec.24, T.13S., R.8 E.	R.lacustre, R.inerme	Poor	Goodding
	Suttle Lake	Sec. 28,T.13 S., R.8 E.	R.sanguineum	Excellent	Goodding
Jospehine	Elk Creek	Sec. 13,14,T.41S., R.9W.	R.bracteosum	Exc.P.lambert.	Goodding
	Grave Creek	Sec. 11, T.34 S., R.6 W.	R.klamathense	None	Goodding
Klamath	Klamath Lake	Sec.25,26,36,T.36 S.,R.7E.	R.klamathense	None	Goodding
	Klamath River	Sec.31, T.39 S., R. 7E.	R.velutinum	None	G.A.Root
	Klamath River	Sec. 2, T.40 S., R. 6E.	R.sanguineum, R.lobbii	P.mont. Good	G.A.Root
	Prairie Creek	Sec. 6, T.40 S., R. 6E	R.sanguineum	Fair	G.A.Root
Lake	Bauer's Creek	Sec.12, T.37 S., R. 19 E.	R.petiolare	None	Goodding
Lane	Yachats	Sec.25,26,T.14 S., R.11W.	R.bracteosum	None	Goodding
	McKenzie	Sec.4, T.16S., R. 4E.	R.bracteosum	None	Goodding
	South Fork McKenzie	Sec.1, T.19S., R. 5½ E.	R.bracteosum,R.lacustre	Good	Goodding
	N.Fork Willamette	Sec.35,36,T.19 S., R.4E.	R.bracteosum	Fair	Goodding
	N.Fork Willamette	Sec.31,32,T.19 S., R.5E.	R.bracteosum	Good	Goodding
	Salt Creek	Sec.21,27,T.22 S., R.5E.	R.bracteosum	Excellent	Goodding
	Willamette	Sec.2,11,12, T.26 S., R. 5E.	R.cereum, R.lacustre R.sanguineum	Excellent	Goodding
	Willamette	Sec.22,23, T.24S., R.5E.	R.lacustre, R.sanguineum R.hallii, R.cereum	Excellent	Goodding
Linn	Santiam	Sec.16, T.12 S., R.7E.	R.sanguineum	Good	Goodding
	Santiam	Sec.28, T.12 S., R.7E.	R.lacustre	Poor	Goodding
	South Santiam	Sec.31, T.13 S., R.7E.	R.lobbii, R.lacustre R.cereum	Poor	Goodding
	Fish Lake	Sec.32, T.13 S., R.6E.	R.bracteosum	Excellent	Goodding
	Santiam	Sec. 4,5, T.14 S., R.5E.	R.bracteosum, R.sanguineum	None	Goodding
	South Santiam	Sec.33, T.13 S., R.4E.	R.bracteosum	None	Goodding

TABLE NO. 4

SCOUTING IN OREGON, 1933

Host Species	Number Host Plants Examined by Regions			
	Blue-Wallowa Mountains	Warner Mts.	Smith and Winchuck Rivers	All Areas
R. petiolare	40	80		120
R. lacustre	35			35
R. montigenum	6	25		31
R. cereum		60		60
R. inerme		10		10
R. marshallii		50*		50
R. bracteosum			300	300
R. creuntum			50	50
R. sanguineum			35	35
R. divaricatum			25	25
R. menziesii			25	25
All Ribes	81	225	435	741
P. monticola	10	20	10	40
P. lambertiana		20*	25	45
P. albicaulis	75			75
All pines	85	40	35	160

*Scouting en route between Klamath Falls and Ashland.
Above table compiled by E. L. Joy, Junior Forester.

RHODODENDRON RIBES GARDEN

The establishment of this garden was reported in the 1930 Annual Report. A discussion of conditions there was given in the 1931 and 1932 reports. Following is a table and discussion of the 1933 observations, presented by H. G. Lachmund, Pathologist of the Division of Forest Pathology.

"Last year the bushes were inoculated artificially and percentage of leaf surface infected was high in all species, ranging over 80 percent of the total leaf area in _R. velutinum_, _R. klamathense_ (both varieties), _R. cruentum_ _R. marshallii_ and _R. binominatum_. Abundant telia were produced on all species except _R. velutinum_ where premature defoliation caused by the rust prevented such telia production.

"This year the bushes were left to become naturally infected and variation apparently resulted in part from variation in the deposit of aeciospores due to local differences in screening and in air currents within the garden.

TABLE NO. 5

SUMMARY OF INFECTIONS ON RIBES WHICH DEVELOPED DURING 1933

Species	Total Leaves	Leaves Infected	Percentage of Total Leaf Surface Infected	Percentage of Total Leaf Surface Bearing III
R. marshallii	2,855	2,845	14.90	9.60
R. klamathense (Prospect)	572	572	12.60	10.50
R. cruentum	4,065	3,615	4.70	3.00
R. klamathense (Klamath Lake)	1,160	1,135	4.50	2.70
R. velutinum	1,537	1,180	2.50	2.20
R. nevadense (Oregon Caves)	810	635	2.00	1.10
R. binominatum	6,220	5,805	.30	.12
R. sanguineum (Native)	15,690	14,530	.12	.09
R. hallii	4,200	1,565	.05	.03
R. erythrocarpum	875	165	.02	.02
Norwegian Red Dutch	1,420			

RIBES ERADICATION - ROGUE RIVER NATIONAL FOREST
1933

By
C. P. Wessela
Agent

INTRODUCTION

Ribes eradication for the control of white pine blister rust on the white and sugar pine stands of the upper Rogue River drainage was made possible, late in the summer of 1933, by an appropriation of funds through the NIRA program. No control measures had been carried on in this region since 1925, when Ribes were eradicated from 1,834 acres. Control operations were continued in 1933 on areas adjacent to that worked initially in 1925. Some portions of the 1925 area were reworked.

GENERAL DESCRIPTION OF AREA

All Ribes eradication was carried on in the vicinity of Woodruff Meadows and the Rogue River, approximately 10 miles north of Prospect, Oregon.

In the immediate vicinity of Woodruff Meadows and the Rogue River, the topography is either flat or gently rolling. This area supports a mixed stand of Douglas fir, western hemlock, western white pine, white fir (*Abies concolor*) and Ponderosa pine. Good white pine reproduction occurs on small burns along the Rogue River. Farther west from the Rogue River the slopes are moderately steep with occasional rocky buttes occurring along the ridges. Douglas fir, sugar pine and incense cedar grow in mixed stands on this area. The timber on approximately 72 percent of the above mentioned areas is over mature and beginning to open up, permitting young growth to become established.

The area presented a variety of working conditions. The mature timber types were easy to work. Brush concentrations encountered on the other Ribes eradication types made working difficult. *Ribes Klamathense* occurred in dense concentrations scattered over Woodruff Meadows and on lowland stream type. The eradication of this species was difficult because of its trailing habit, long thorns and close association with brush. It presented working conditions similar to those encountered in *R. inerme* concentrations in Idaho forests. In some cases modified slashing was necessary. The upland stream type carried medium concentrations of *R. lacustre* and *R. sanguineum*, which were comparatively easy to eradicate.

ORGANIZATION AND ADMINISTRATION

One unit supervisor from the Division of Blister Rust Control was responsible for the organization and administration of the project. Two 25-man camps comprised the Ribes eradication field force. Since work started late in the season, a comparatively large checking organization, composed of one foreman and five checkers, was organized in order to precheck large areas considered Ribes free, and to carry on a preeradication survey.

One man was responsible for the purchasing of supplies and transporting them from Medford, Oregon to the camps.

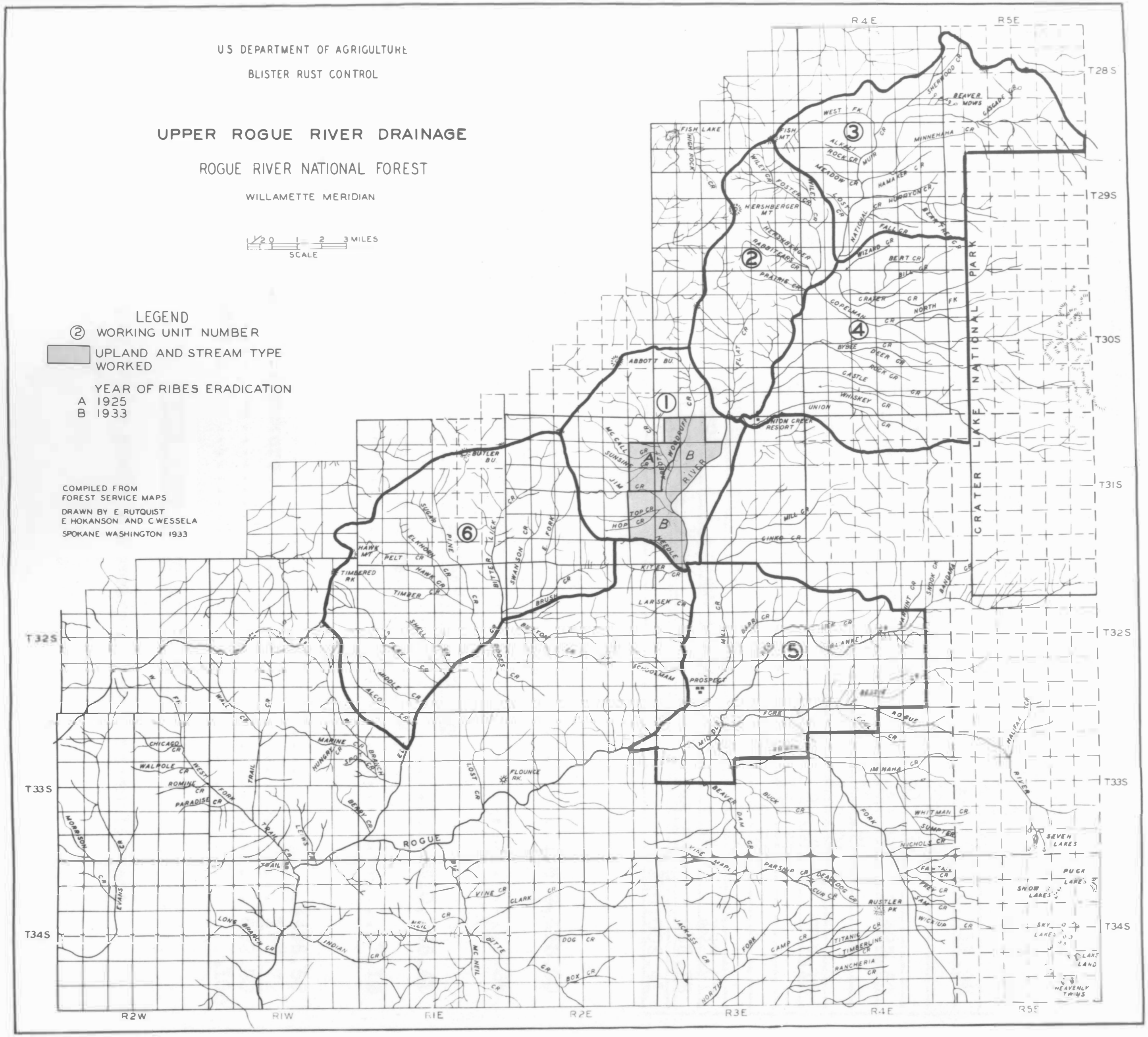
PERSONNEL

All laborers were hired through relief agencies. As only one camp boss and the unit supervisor had experience in blister rust control work, considerable time was spent in the first ten days teaching the men in methods of Ribes eradication, and to identify the eight species of Ribes encountered on the area. However, they made an efficient crew later in the season.

METHODS AND EQUIPMENT

The work was done entirely by hand pulling methods, using the standard 3-man crew. A combination of slashing and hand pulling was used on heavy concentrations of *R. klamathense.* The associated brush was cut and piled to enable the men to pull the entwined Ribes bushes.

Large areas were blocked out as Ribes free by the camp bosses, unit supervisor and checkers.


U S DEPARTMENT OF AGRICULTURE
BLISTER RUST CONTROL
UPPER ROGUE RIVER DRAINAGE
ROGUE RIVER NATIONAL FOREST
WILLAMETTE MERIDIAN
SCALE
3 MILES
LEGEND
② WORKING UNIT NUMBER
UPLAND AND STREAM TYPE WORKED
YEAR OF RIBES ERADICATION
A 1925
B 1933
COMPILED FROM FOREST SERVICE MAPS
DRAWN BY E RUTQUIST
E HOKANSON AND C WESSELA
SPOKANE WASHINGTON 1933
CRATER LAKE NATIONAL PARK
R4E
R5E
T28S
T29S
T30S
T31S
T32S
T33S
T34S
R2W
R1W
R1E
R2E
R3E
FISH LAKE
ABBOTT BU
UNION CREEK RESORT
BUTLER BU
TIMBERED RK
PROSPECT
FLOUNCE RK
ROGUE
RIVER
SEVEN LAKES
SNOW LAKES
HEAVENLY TWINS

ANALYSIS OF COSTS

TABLE NO. 1

STATEMENT AND ANALYSIS OF COST OF OPERATION

Item of Expenditure		Cost	
		Per Item	Total
	Supervision	$ 808.98	
Salaries	Labor	5,303.00	$ 6,111.98
	Wages, cooks & flunkies	669.80	
	Cost of food	1,412.24	
Subsistence	Transportation of food	411.56	2,493.60
	Cost	572.94	
	Transportation	122.01	
General equipment	Repairs	22.23	717.18
	Travel Expenses	165.91	
	Telegrams	9.66	
	Medical supplies	7.20	
Miscellaneous	Special and experimental	4.30	187.07
Checking	Salaries	496.58	496.58
Grand Total			$10,006.41

Statement of meal costs

Total cost of subsistence..............................$ 2,493.60
Number of meals served...........7,355
Average cost of meals served...............................34

Statement of composite cost per effective man day

Total cost of operation.............................$10,006.41
Total number effective man days.........1,403
Cost per effective man day...............................7.13

Cost of checking

Salaries..$496.58
Subsistence of checkers............................155.72
Total cost.. 652.30
Cost per acre.:.......................................106

WORK PERFORMED AND RESULTS

The following table gives a summary of work accomplished:

TABLE NO. 2

RIBES ERADICATION ON THE ROGUE RIVER NATIONAL FOREST

Working Unit	Type	Acres	Man Days	Number of Ribes Pulled										Per Acre Basis		
				R. lac.	R. sang.	R. lob.	R. vis.	R. cer.	R. klam.	R. bin.	R. creun.	Total Ribes	Total Cost	Man Days	Ribes	Cost
1	O.R.	406	191	2,989	3,524	772	22	16,096	818	73	829	25,123	$1,362.24	.47	62	$3.36
	D.P.	202														
	O.M.	4,704	512	15,341	4,695	1,611	626	1,539	15,012	955	45,532	85,311	3,651.66	.11	18	.78
	D.M.	90														
	Meadow and Brush	85	74	319				111	36,970			37,400	527.78	.87	440	6.21
	All Upland	5,487	777	18,649	8,219	2,383	648	17,746	52,800	1,028	46,361	147,834	5,541.68	.14	27	1.01
	Stream	526	497	55,375	9,951	1,739	357	187	66,809	929	821	136,168	3,544.68	.94	259	6.74
	All Types	6,013	1,274	74,024	18,170	4,122	1,005	17,933	119,609	1,957	47,182	284,002	9,086.36	.21	47	1.51
	* Stream	129	129	3,218	1,004	165	2	8	676	53	36	5,162	920.05	1.00	40	7.13
	Total	6,142	1,403	77,242	19,174	4,287	1,007	17,941	120,285	2,010	47,218	289,164	$10,006.41	.22	47	$1.63

Dense pole, dense mature, and approximately 2,500 acres of open mature types were Ribes free. This acreage included in the above summary.
*Rework of area worked initially in 1925.

RECOMMENDATIONS

Blister rust infection of 1927 origin has been discovered on white pine approximately 50 miles north of the upper Rogue River. The disease appears to be creeping steadily toward the valuable white and sugar pine stands of this drainage. A good beginning has been made toward control of the rust in this region. A late start and inexperienced men added considerably to the cost of this year's project. Work should be continued in the future as rapidly as possible in order to save the pine, not only for its commercial value, but also, for the aesthetic value which it lends to the scenic drive to Crater Lake National Park.

For future work on the Rogue River National Forest, the following is recommended:

1. Extensive use of the advance check system especially in sugar pine type.

2. Investigation regarding the cheapest and most effective means of eradicating *R. klamathense* and *R. cereum*.

3. An intensive survey of the more valuable stands of white and sugar pine, to determine conditions of Ribes occurrence and growth, in regard to cost of control.

PREERADICATION SURVEY - ROGUE RIVER NATIONAL FOREST
1933
By
C. P. Wessela
Agent

The preeradication survey on the Rogue River National Forest conducted during the fall of 1933, was made to determine the location and numerical abundance of white pine, sugar pine and Ribes on the area surveyed.

A total of 274,560 acres was covered on the Upper Rogue River drainage. This area is bounded on the south by the township line between townships 34 and 35 south, on the west by the range line between ranges 1 east and 1 west, on the north by the Forest boundary, and on the east by the Crater Lake National Park boundary and the range line between ranges 4 and 5 east. The following townships of this area have not been surveyed: townships 32 and 33 south, range 2 east, and townships 33 and 34 south, range 1 east.

Costs

Salaries....................	$2,070.50
Transportation of men.......	88.07
Subsistence.................	424.60
Total...........	$2,583.17

Cost per acre - $2,583.17 ÷ 274,560 acres = $.0094.

BLISTER RUST CONTROL WORK IN CALIFORNIA
1933

Blister rust control activities in California were continued as a cooperative project between the Bureau of Plant Industry and the California Department of Agriculture, the California State Board of Forestry, and the College of Agriculture, University of California. There is given below the amendment to the basic memorandum of understanding, which was drawn up to cover the cooperative work for the fiscal year 1934 beginning July 1, 1933.

Amendment No. 2
Spokane, Wash.

AMENDMENT TO
MEMORANDUM OF UNDERSTANDING
Effective July 1, 1931
Between
THE UNITED STATES DEPARTMENT OF AGRICULTURE, BUREAU OF PLANT INDUSTRY, THE CALIFORNIA DEPARTMENT OF AGRICULTURE, THE CALIFORNIA STATE BOARD OF FORESTRY, AND THE COLLEGE OF AGRICULTURE, UNIVERSITY OF CALIFORNIA

Cooperative Work in Controlling White Pine Blister Rust in California

* * *

The undersigned mutually agree that the memorandum of understanding between the United States Department of Agriculture, Bureau of Plant Industry, the California Department of Agriculture, the California State Board of Forestry, and the College of Agriculture, University of California, effective July 1, 1931, to continue in effect until June 30, 1932, shall be continued in full force and effect in all its provisions for the fiscal year ending June 30, 1934 with the exception of paragraphs F-1 and F-6, which shall be amended to read as follows:

F-1. That this memorandum of understanding shall take effect July 1, 193 and continue in effect until June 30, 1934, provided that either party may terminate the agreement at any time by a written statement to that effect 30 days in advance of the date of termination desired.

F-6. That for the fiscal year July 1, 1933 to June 30, 1934 the California Department of Agriculture will contribute in value approximately $9,000.00, the California State Board of Forestry approximately $3,000.00, the College of Agriculture, University of California approximately $10,00.00, and the Federal Government in behalf of the United States Department of Agriculture, Bureau of Plant Industry approximately $22,000.00 in connection with the work herein provided for.

March 23, 1934 — A. B. Burk
Director, California Department of Agriculture

March 23, 1934 — M. B. Pratt
State Forester, California State Board of Forestry

April 20, 1934 — C. B. Hutchison
Dean, College of Agriculture, University of California.

April 30, 1934 — K. F. Kellerman
Chief of Plant Industry, U. S. D. A.

RIBES ECOLOGY, CALIFORNIA

By
George A. Root
Associate Pathologist

INTRODUCTION

The Ribes ecology work during 1933 was confined to checking over some of the established plots on the Stanislaus National Forest. No new work was undertaken, owing to the demand for trained personnel for the eradication work.

The writer, with the aid of the two CCC men, continued the following studies:

A. Ribes reestablishment in stream type after logging.
B. Ribes reestablishment after eradication on cut-over land.
C. Ribes growth and germination on a non-eradicated, logged-off area.
D. Ribes seed germination and seedling survival.
E. Ribes seed storage in the duff and soil (1, 2, 3.)
F. Crown and root studies of Ribes bushes.
G. Miscellaneous studies.

A. Ribes Reestablishment in Stream Type after Logging.

This study was begun in 1929, when a 6-acre plot was established on a branch of the North Fork of the Tuolumne River near Strawberry on the Stanislaus National Forest. (See 1931 Annual Report, page 254, and 1932 Annual Report, pages 234 and 236.) Logged in 1929, checks were kept on the number of Ribes and feet of live stem which were found. Old and new bushes were removed each year.

The results are given in the following table:

TABLE NO. 1A

RIBES REESTABLISHMENT IN STREAM TYPE AFTER LOGGING

Ribes Species	Number of Ribes Per Acre																	
	Old Bushes Found in				Germinating in 1929 Found in				Germinating in 1930 Found in				Germinating in 1931 Found in			Germ. in 1932 Found in		Germ. in '33 Found in
	1930	1931	1932	1933	1930	1931	1932	1933	1930	1931	1932	1933	1931	1932	1933	1932	1933	1933
R. roezli	14	11	1	9.0	7	0	1	7	230	16	2	16.0	321	19	29.0	100	10	39
R. nevadense	6	9	0	1.0	6	0	0	2	365	8	2	6.0	284	20	10.0	15	4	3
R. cereum	1	0	0	.3	0	0	0	0	7	0	0	.6	0	1	1.2	0	0	0
Totals	21	20	1	10.3	13	0	1	9	602	24	4	22.6	605	40	40.2	115	14	42

TABLE NO. 1B

RIBES REESTABLISHMENT IN STREAM TYPE AFTER LOGGING

Ribes Species	Feet of Live Stem Per Acre																	
	Old Bushes Found in				Germinating in 1929 Found in				Germinating in 1930 Found in				Germinating in 1931 Found in			Germ. in 1932 Found in		Germ. in '33 Found in
	1930	1931	1932	1933	1930	1931	1932	1933	1930	1931	1932	1933	1931	1932	1933	1932	1933	1933
R. roezli	212	63	2	37	23	0	4	19	46	46	2	14.0	64	10	15.0	10	3	4.0
R. nevadense	44	101	0	5	7	0	0	7	70	29	3	6.0	57	11	5.0	1	1	.3
R. cereum	2	0	0	1	0	0	0	0	1	0	0	.6	0	1	.6	0	1	0
Totals	258	164	2	43	30	0	4	26	117	75	5	20.6	121	22	20.6	11	4	4.3

New Ribes bushes appeared in large numbers the first year after logging and continued each year, but in diminished numbers. As the fruiting bushes were removed each year, seedlings probably came from stored seed present in 1929.

The paucity of bushes, other than seedlings, in 1932 is partially due to inadequate checking - the writer covered this 6-acre plot alone, and it is evident that a considerable number of bushes were missed, which would have been found with a larger force of men.

The important point to be noted is that new bushes were found in large numbers in 1930, 602 seedlings, and 1931 605 seedlings, while in 1932 and 1933, only 115 and 42 seedlings, respectively, were found. Thus it would seem that eradication for control must be done more than once over logged-off areas in stream type, and preferably not prior to four years after the original eradication.

B. Ribes Reestablishment after Eradication on Cut-over Land.

The purpose of this study is concisely given in the 1931 Annual Report, page 255. It is based on a 1.6-acre plot in sugar pine-fir type, cut over in 1925 and established in 1930 at Cow Creek on the Stanislaus National Forest. This area bore an unusually large number of Ribes bushes with heavy fruiting capacity. The old bushes were removed in 1930, and the fruit left lying on the ground. Subsequent checks each year have shown a large number of seedlings. All bushes have been eradicated each year.

The 1933 results have been recorded in the following form:

TABLE NO. 2

RIBES REESTABLISHMENT AFTER ERADICATION ON CUT-OVER LAND

No. of Seedlings Per Acre	1-Yr. Old Bushes Per Acre	Number Bushes 1/2 F.L.S. Per Acre	Number Bushes 1 F.L.S. Per Acre	Number Bushes 2 to 3 F.L.S. Per Acre	Number Bushes Over 3 F.L.S. Per A.	Sprouts Per Acre
7,549	1,318	50	23	7	8	13

According to the 1931 Annual Report, there were 1,476 bushes per acre on this plot when first eradicated in 1930. In 1931, 32 bushes and 19,053 seedlings per acre were found. No mention is made of the 1932 examination of this plot in the 1932 Annual Report. For 1933, one perceives a great reduction in the number of seedlings. Bushes other than seedlings continue to be found each year, showing the difficulty of getting all bushes every year in a heavy Ribes area.

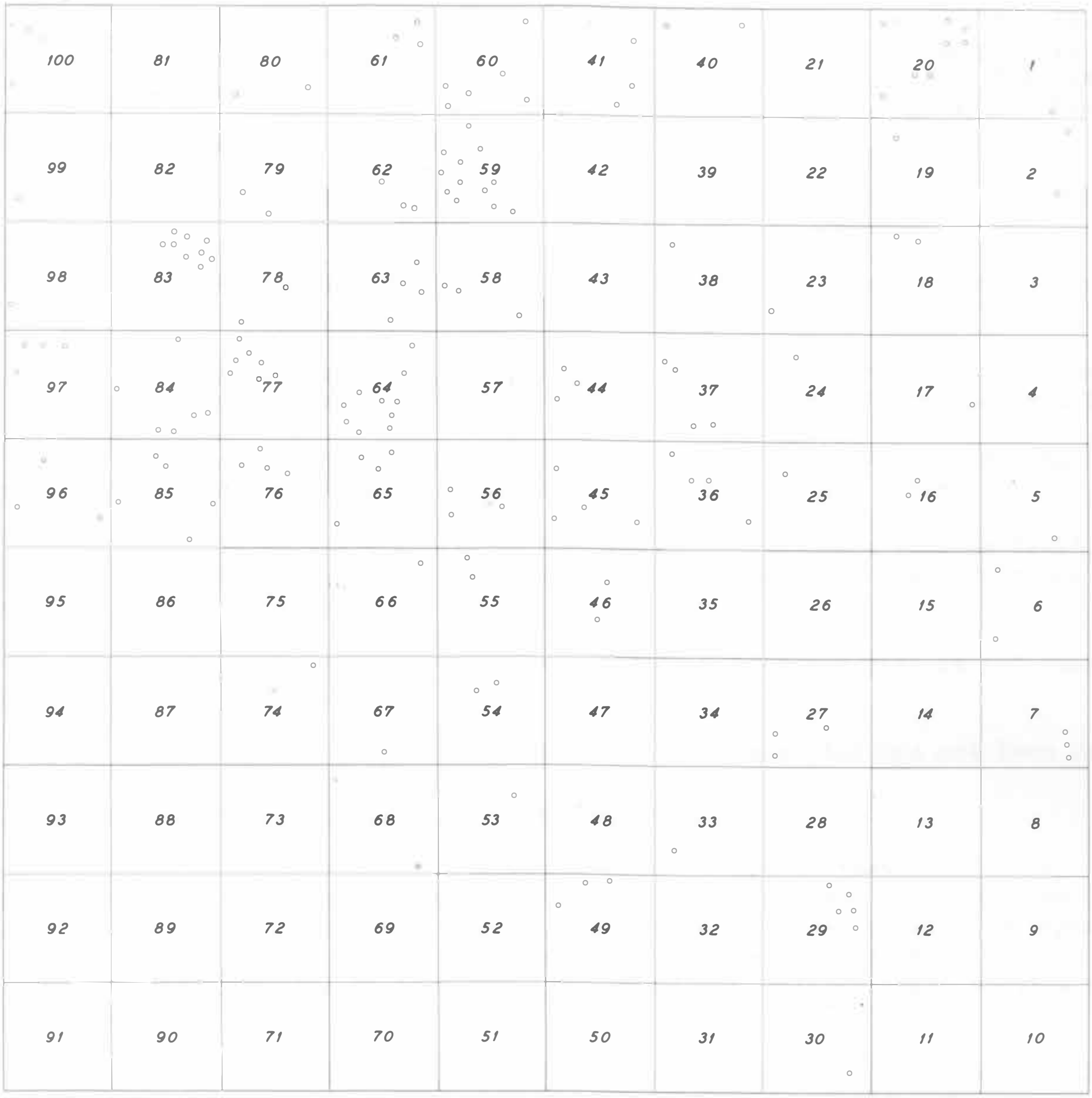
C. Ribes Growth and Germination on a Non-eradicated Logged-off Area.

The following data are based upon the study of the 10-acre Cow Creek Plot on the Stanislaus National Forest described in the 1931 Annual Report.

RIBES DISTRIBUTION MAP
OF

COW CREEK SAMPLE PLOT

STANISLAUS NATIONAL FOREST
CALIFORNIA



LEGEND

SCALE

CHAIN

∘ RIBES BUSH

7 SUB PLOT

RIBES DATA BY G.A. ROOT - DRAWN BY W.E. WHITE
MARCH - 22, 1934

ANNUAL REPORT 1933
G. A. ROOT

page 257. This area is a sugar pine-yellow pine type, logged in 1923 and checked in 1928. All bushes have been staked as found each year.

The number of bushes found in 1928 was 82; in 1929, 146; in 1930, 185; and in 1931, 154. This is a corrected figure made in 1933. The figure originally given in the 1931 Annual Report was 139 instead of 154. A number of bushes were missed that year due to heavy brush. The plot was not checked in 1932. The 1933 examination revealed 27 new bushes, having come in since 1931 or some so small at that time as to prevent discovery. Thus on the plot in 1933, there were 181 bushes - two had died since 1931. There were 90 fruiting bushes in 1933, and the amount of live stem was 3,603 feet or an average of 360 feet per acre. The average number of bushes per acre was 18.

A number of interesting deductions can be made from a study of this plot though some have already been mentioned in previous reports:

1. That there is an increase in the number of bushes after logging as evidenced in the years from 1928 to 1930.

2. That during some years due to climatic or other conditions there is a certain death rate, as shown by the decline from 185 in 1930 to 154 in 1931.

3. That during this interval a new crop of seedlings was coming in, making themselves evident in 1933 by the discovery of 27 new bushes.

4. That nearly one-half of the bushes in 1933 were bearing fruit, the seed of which will probably add a new crop of seedlings when conditions become right for germination.

5. That shading out of bushes on this particular plot is not causing a large decrease in the number of bushes.

6. That the maximum number of bushes on this plot has not been reached.

D. Ribes Seed Germination and Seedling Survival.

The study this year is simply a continuation of that of 1932, a description of which may be found in the 1932 Annual Report, pages 237 and 238. See also the 1931 Annual Report, pages 258 and 260. It was originally begun to determine the effect of soil disturbance on Ribes seed germination, but the study has not evolved into one to find the percentage of seedlings which survive from year to year.

Of the nine plots on which this study is based, two plots are divided into irrigated and non-irrigated portions, and a separate study of each has been made.

TABLE NO. 3

RIBES SEED GERMINATION AND SEEDLING SURVIVAL
IRRIGATED AND NON-IRRIGATED PLOTS

Year Plots Established	No. Ribes Found in 1932	No. Ribes Found in 1933	Number of Deaths	Survival Percentage	No. of Seedlings Found in 1932	No. of Seedlings Found in 1933
1929 Non-irrigated	40	15	35	37.5	33	46
1929 Irrigated	114	107	7	93.8	57	0
1930 Non-irrigated	153	0	153	0.0	153	3
1930 Irrigated	143	76	67	53.8	110	3
Totals or Averages	450	198	262	44.0	353	52

The remaining seven plots are grouped together as one unit - three established in 1929 and four in 1930.

TABLE NO. 4

RIBES SEED GERMINATION AND SEEDLING SURVIVAL

Year Plots Established	No. Ribes Found in 1932	No. Ribes Found in 1933	Number of Deaths	Survival Percentage	No. of Seedlings Found in 1932	No. of Seedlings Found in 1933
1929	616	248	368	40.2	333	13
1930	850	24	826	2.8	806	40
Totals or Averages	1,466	272	1,194	18.5	1,139	53

Two interesting features are brought out from a study of Table No. 3: (1) that the survival of bushes is greater on the irrigated than on the non-irrigated portions, (2) that there was much less germination in 1933 than in 1932, probably indicating that the peak has been reached.

In Table No. 4 one is impressed with the small number of seedlings of 1933 as compared with 1932 and the almost complete collapse of survival from 1932 to 1933 on the 1930 plots.

E. Ribes seed Storage in the Duff and Soil.

1. The purpose and description of this study is found in the 1931 Annual Report, top of page 249. An examintion of these compartments in 1933, revealed

that no seedlings were present in the top layer of loose needles and other forest debris; in the second layer consisting of compact humus, 2.5 percent of the compartments contained seedlings, and in the third layer consisting of mineral soil, 10 percent of the compartments contained seedlings.

2. The purpose and description of this study of what might be called scarification strips is given in the 1931 Annual Report, bottom of page 249. See also 1932 Annual Report, page 239, paragraph 5. On only one strip did there appear any Ribes and then only one seedling. Two years have elapsed since establishing this study and indications point that very few seedlings will appear, probably due to lack of stored seed on these particular areas thus disturbed.

3. The purpose and description of this study are given in the 1931 Annual Report, pages 249-250. See 1932 Annual Report, page 239, paragraph 4. An examination of these four plots in 1932 revealed an average of 21 seedlings per plot. In 1933, examination showed close to 100 seedlings per plot. Three bushes germinating in 1932 still survive in one plot, and no Ribes at any time have appeared in one other plot. These were planted in 1931 with 1931 seed. On the check plots one volunteer occurred.

It is hoped these plots will indicate whether or not it is important to find all of the fruiting bushes the first time over on cut-over lands. If Ribes seeds will remain in the soil over a long period and still retain their viability, it will be important to get all of the fruiting bushes and keep new ones from reaching that stage. Otherwise Ribes eradication on cut-over lands would be an endless task.

F. Crown and Root Studies of Ribes Bushes.

Much interest has been manifested as to the degree with which bushes may recuperate when subjected to crown and root cutting. With this in mind, five plots were established during 1930 and 1931, on which the bushes were subjected to various degrees of mutilation.

A check of these plots in 1933 revealed that: (1) of 130 bushes which had the stems cut off at the crowns and covered with dirt, 68 or 52 percent showed a regrowth of live stems, (2) of 139 bushes with the stems cut off at the crown, but left exposed, 74 or 53 percent showed regeneration, (3) of 129 bushes cut off 3 inches below the crown and covered with dirt, 7 or 5 percent showed regrowth, and (4) of 136 cut off 3 inches below the crown but left exposed, 6 or 4 percent showed sprouting.

There seems to be little difference whether the parts of the bushes are left exposed or not. Contrary to the popular belief, a considerable number of bushes succumbed when the tops were cut off at the crowns. It was found that 50 percent of the sprouting bushes were bearing fruit.

Mention should be made that one plot, where the live stems and roots were cut off with a mattock, showed a slightly higher percentage of survival than on those plots where pruning shears were used. The bushes treated on all the plots

were not exceptionally large ones.

G. Miscellaneous Studies

1. In 1929, several hundred Ribes roezli fruits were placed on top of the ground in screened boxes. In 1930, 1931, 1932 and 1933, some germination has taken place, though these seeds have been exposed to the elements with attending chances for desiccation, excessive moisture and freezing. Undoubtedly viable seed still remain which have not germinated.

2. The depth at which Ribes seed may be planted and still germinate into seedlings has been partially solved by the results obtained on three small plots established under different conditions. One plot, partially shaded in a sugar pine-fir type, was planted with seed in 1931 at depths ranging from 1 inch to 6 inches by half inches. In 1933, seedlings were up at the 1 inch and 2-inch stakes. On two other plots more exposed, 1930 seeds were planted in 1932. In 1933, seedlings were present from the 1/4-inch stake to 2-1/2-inch stake; very few, however, at this last depth. This seems to be about the limit at which seedlings can push their way through.

SUMMARY

1. In stream type Ribes seedlings begin to appear the first year following logging, reach a maximum the second year and then gradually decline. However, seedlings still appear the fourth year.

2. On cut-over land in a sugar-pine-fir type, the number of seedlings is greatly enhanced and likewise a greater number of bushes will be present where eradication does not take place until three or four years after logging. Heavily fruited bushes, when eradicated four or five years later and not removed from the area, leave an innumerable number of seeds which reach a maximum germination the third year after eradication and then decline.

3. Shading out by brush on a logged-off area not eradicated has not caused a marked decrease in the number of bushes over a ten-year period.

4. The survival of seedlings is greater where moisture is present and seeds do not all germinate even four years after time of planting.

5. Ribes seed tend to repose in mineral soil, or at least germinate there more readily than in the top and second layer of duff. Viable seed, however, were found in the top loose layer of needles and in the middle layer of duff.

6. Ribes bushes in quite a few cases will succumb when cut off at the crowns. It seems to make but little difference in the sprouting ability, whether cut-off crowns are covered with dirt or not - the same with cut off roots.

7. Ribes seed seem to germinate with nearly equal facility when planted at depths from 1/2-inch to 2 inches. This depth seems to be about the maximum at which the seedlings will push their way through, though a few may occur at 2-1/2 inches.

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8. Ribes seed have remained viable when stored in the soil for a p of four years.

EDUCATIONAL WORK

The type and scope of the blister rust work in California during 19 seemed to preclude any definite educational program for the state. The activities required the services of all available trained men, with the result that no special educational work was promulgated, particularly in the way of exhibits.

During the early part of 1933, a resume' of the work for 1932 was sent to the Agricultural Commissioners, Farm Advisors, Forest Supervisors, and others, directly or indirectly interested in the work. Likewise a short report of the 1932 activities was printed in one of the monthly bulletins of the State Department of Agriculture. On January 5 a radio talk, "1932 Progress in Blister Rust Control" was given over Station KGO in San Francisco.

An endeavor was made to supply the ECW camps with literature and specimens, where blister rust work was being conducted. Later on the NIRA camps were furnished with similar material. During the NIRA work on the Stanislaus Forest, W. V. Benedict, Assistant Forester, gave a talk accompanied by lantern slides, before the Lions Club at Sonora. Newspaper articles on the progress of the work occasionally appeared in the Sonora and Stockton papers.

RIBES ERADICATION AND RELATED ACTIVITIES IN CALIFORNIA, 1933

By
W. V. Benedict
Assistant Forester

INTRODUCTION

The following report embraces accounts of Ribes eradication in California by the CCC, that done under the authority of the NIRA, control reconnaissance and preliminary Ribes eradication surveys conducted in several parts of the state, and the present status of the sugar pine survey of California. Each of these subjects has been treated separately as a unit, and occupies one of the major divisions of this report.

The year 1933 marked the change in California from the experimental work of previous years to actual Ribes eradication on a practical control basis. This was brought about in part by the partial consummation of experimental work, but more especially by the availability of labor in desired locations through the establishment of the CCC and by the institution of the NIRA program of the President. From 1926 to 1932, experimentation evolved flexible methods of hand eradication adapted to conditions found throughout the sugar pine belt of the Sierra Nevada. Even though the rust was not known to be present in the state, the peculiar opportunities for large scale control offered by the CCC and NIRA projects were not to be cast aside, and constituted an admirable means of beginning a program which would forestall such a state of unpreparedness as occurred in the Idaho white pine belt a few years ago. Therefore, with effective methods at hand, and labor and money made available, Ribes eradication over large areas was started. A total of 5,661,189 Ribes, an average of 142 per acre, were eradicated from 39,715 acres of sugar pine type on parts of Yosemite National Park, Calaveras State Park and the Stanislaus, Eldorado and Plumas National Forests; 28,112 man days of labor were used to accomplish this work.

Technical supervision of all blister rust work in California both by the CCC and with funds made available by the Public Works Administration during the 1933 field season was vested in the following personnel of the Division of Blister Rust Control:

General Supervision, W. V. Benedict, Assistant Forester.

CCC Work

Plumas Forest, Slate Creek and Canyon Dam Camps - T. H. Harris, Junior Forester.

Eldorado Forest, Bear Riber Camp - D. R. Miller, Junior Forester.

Stanislaus Forest, Dorrington and Big Trees Camps - D. R. Miller, Junior Forester.

Stanislaus Forest, Strawberry Camp - R. Blomstrom, Junior Forester.

Stanislaus Forest, Camp 17 - F. A. Patty, Assistant Pathologist

Yosemite Park, Crane Flat camps Nos. 3 and 5 - F. A. Patty, Assistant Pathologist.

Yosemite Park, Control Reconnaissance - F. A. Patty, Assistant Pathologist.

NIRA Work, Stanislaus Forest

3 camps in the vicinity of Dorrington - D. R. Miller
4 camps in the vicinity of Strawberry - R. Blomstrom
2 camps in the vicinity of Camp 17 - F. A. Patty

SUMMARY OF RIBES ERADICATION WORK

TABLE NO. 1

SUMMARY OF RIBES ERADICATION WORK IN CALIFORNIA IN 1933

	Class of Work	Acres Covered	Man Days Worked	Ribes Eradicated	Aver. No. Per Acre
CCC	Initial Eradication	12,491	12,021	2,173,808	174
	Reeradication	5,900	3,020	188,406	32
	Total	18,391	15,041	2,362,214	128
NIRA	Initial Eradication	21,324	13,071	3,298,975	155
	Grand Total	39,715	28,112	5,661,189	142

Control reconnaissance was conducted on 64,379 acres largely in Yosemite National Park and the Stanislaus National Forest.

The preliminary Ribes eradication surveys resulted in the examination of the pine, Ribes conditions and camp sites on 340,158 acres of sugar pine type on the Plumas, Eldorado and Stanislaus National Forests.

According to the sugar pine survey of California, there are 3,120,137 acres of sugar pine type in California. The Lassen, Plumas, Eldorado, Stanislaus and Sierra National Forests have a total stand of 11,523,132 M.B.M. of sugar pine.

METHODS OF PERFORMING RIBES ERADICATION WORK IN CALIFORNIA

General

The white pine blister rust is excluded from or controlled in sugar pine areas by the elimination of the alternate host plants, members of the genus Ribes. This is accomplished by the use of three to five-man crews who grub out the plants by the roots.

Within any pine area there exist one or more species of Ribes which vary widely in appearance and habitat. Each species also has different habits of growth in different forest sites and its abundance is governed by ecological features of the area. On moist slopes immediately bordering streams and swamps Ribes are generally abundant. More will be found on the cool north and east slopes where fir timber generally predominates than on south and west slopes where pines are usually found. It is in these moist situations that the Sierra Nevada currant, Ribes nevadense, one of the two principal Ribes species of the sugar pine belt, occurs. The other is the prickly-fruited gooseberry, R. roezli, found in all sugar pine types and under various site conditions. It is most

abundant, however, on moist well drained slopes. Areas that have been logged or burned support more Ribes plants than corresponding virgin areas. In the northern Sierra Nevada the white-stemmed gooseberry, _R. inerme_, occurs in profusion in certain localities along treams. Occasionally at high elevations in the sugar pine belt the squaw currant, _R. cereum_, and the sticky currant, _R. hallii_ will be found.

In order to facilitate the organization and work of crews and to promote efficiency as well as to provide data for formulating control plans, the area selected for control is segregated into types of more or less similar Ribes and working conditions. These types are classified as follows:

1. Stream Type - a zone on either side of streams, large draws or swamps, varying in width with the topography, along which occur concentrations of Ribes.

2. Brush Type - an area having a dense ground cover of brush species; timber absent or very scattered; Ribes moderately abundant.

3. Sugar Pine - Fir Type - usually an uneven aged stand of timber containing 15 percent or more sugar pine by volume, and having as its associates any of the true firs, or Douglas fir: undergrowth generally dense and Ribes abundant; occurs on cool, moist slopes, generally north facing.

4. Sugar Pine - Ponderosa Pine Type - a mature stand of timber containing 15 percent or more sugar pine by volume, with ponderosa pine the principal tree associate; generally open with a small amount of undergrowth and few Ribes, occurs on warm southerly slopes.

5. Cut-over - either of the above timber types after they have been logged, Ribes generally abundant.

ORGANIZATION AND WORK OF CREWS

Prior to any eradication work the area selected for treatment is thoroughly examined by the eradication supervisor with reference to Ribes distribution and general working conditions. With this information as a basis the area is divided into working blocks which may be sections, i. e. square miles, or smaller units within a section bounded by such natural features as streams, ridges, or the like, or by roads and trails as the case may be. Into these blocks the eradication crews are then sent In any block the stream type is worked first since this facilitates the handling of the remainder of the block.

The Ribes species encountered in the sugar pine region are deep-rooted plants and tools are required to properly eradicate them. Each crewman is, therefore, provided with a special pick-mattock for this purpose.

For general use three-man crews are most satisfactory. However, in starting with inexperienced men, five-man crews are used with a man detailed behind to keep the crewmen in proper alignment and to check for missed bushes. These larger crews are broken into three-man units just as soon as the men are completely trained. The crewmen are deployed in echelon formation guiding on the foremost flank man. In no case is the rear flank man more than a few yards

behind the leader. Spacing between men varies from eight to forty feet depending upon the general working conditions and the number of Ribes encountered. Where the intervals are large the men weave back and forth in order to completely cover the ground. To assure complete coverage of a block the rear flank man unwinds a spindle of white twine. This is the guide line for the return strip.

In this formation the crew proceeds forward as rapidly as working conditions permit. Where patches of Ribes occur, as is often the case, the crew will not be able to maintain its formation, but all members will concentrate on removing the patch. However, just as soon as all bushes are removed, the men assume their proper position and proceed. After clearing out a heavy concentration the crew is formed a bit behind the area so that they can again inspect it before moving forward. Since Ribes sprout readily from fragments of the plant and roots left in the ground, extreme care is used to remove all of these. It is necessary also when eradicating large bushes to be careful not to cover smaller ones with debris, since the latter might in this way be overlooked. Bushes that have been grubbed are turned roots uppermost where the sun will readily kill them.

CHECKING THE WORK

After an area has been covered by eradication crews it is systematically checked by men specially trained in such work to determine the number, size and distribution of Ribes missed. A minimum check of 2 percent of upland types and 4 percent of stream type is considered essential. Few data are available at this time to guide in fixing a lower limit of bushes that can be left without causing undue pine damage. This will, of course, vary in different types and with different Ribes species. In lieu of this information, a standard of efficiency of not over 25 feet of live stem or three bushes per acre has been arbitrarily established as a safety factor. Areas are reworked until this standard of efficiency is reached.

INSTRUCTIONS TO BLISTER RUST CAMP SUPERVISORS
California

The following general instructions are intended only to guide you in carrying forward the work, and not to supplant your own initiative which you must use as special problems arise. Working under the general supervision of the blister rust operation supervisor located on the forest, you will be in direct charge of blister rust work done from the camp to which you are assigned. The degree of intelligent supervision you give the job will in a large measure determine the amount and quality of the work performed.

ORGANIZATION AND PERSONNEL

On each national forest an operation supervisor will be in charge of all blister rust work. To him the camp supervisors will be directly responsible and they in their turn will be in charge of the work at their respective camps. At each camp one or more foremen, depending upon the size of the unit, will assist the camp supervisor, and one or more checkers will determine the Ribes conditions after eradication. The checkers will be directed by and responsible to the operation supervisor, but when not engaged in checking they are at the disposal of the camp supervisor.

DUTIES OF THE CAMP SUPERVISORY FORCE

A. Camp supervisor. You are expected to spend the entire working day in the field; it is there that you can most thoroughly familiarize yourself with the area and the working conditions and problems it presents, so that you can intelligently plan the work of the crews. It is there also that you will observe the actual quality of the work being done and watch its performance. The small amount of office work can be done at the end of the day.

Remember first of all that the work must be efficiently done. Too much stress cannot be placed upon the importance of removing Ribes crowns and all large roots. Laxity here on the part of a few men will result in bushes sprouting the next year. Diligent searching is required to locate all bushes; slipshod, careless searching always means reworking an area. A standard of efficiency of not to exceed an average of 25 feet of live stem or three bushes per acre, excluding those of the current year's germination, has been established as a measure of satisfactory work. The especially trained checking men attached to your camp will determine the quality of the work. It is a good plan to instruct your foreman to rework all sectors originally supporting a heavy concentration of Ribes before formally reporting a block as completed.

A part of your time should be spent in sizing up your working area, determining the eradication types and working conditions which the crews will encounter. Although the section will be used as the unit of work, it may be divided on the basis of accessibility and working conditions into segments and a number of crews assigned to each. Roads, trails, streams, and ridges are convenient natural boundaries for working units. You will find it most helpful to prepare a map of your area upon which is shown the location and approximate acreages of the different eradication types and blocks. By indicating with appropriate symbols the blocks completed, you will be enabled at all times to determine the progress of the work under your supervision.

B. Foreman. One or more foremen, approximately one to every 25 crewmen, will assist you in directing the work. The foreman's entire time should be spent in organizing crews, keeping them working, and inspecting their work. He should study each crewman, his rate of speed, ability, and general aptitude so that by proper crew organization he can obtain the best results with his men.

When the work is first started crews should consist of 4 or 5 men in line, with one man designated as crew leader, detailed behind the line to check for missed bushes and to keep the crewmen in proper alignment. After the crews have worked in this formation long enough for the foremen to fully size up the men, formations can be altered and as many three-man crews as possible used. Men should be grouped according to ability, all of them not well fitted to blister rust work being retained in the larger crew organization. In the three-man crew no one will be detailed to check behind the men. The personnel of such crews should consist of the best workmen, men whom you can depend upon to do conscientious work. One member of each crew should be designated as leader. The leader will be responsible to the foreman for the work of the crew.

Records to be kept.

(a) Crews - each crewman will keep an accurate record by species of all Ribes eradicated and report them periodically to the crew leader. Caution the men to report a true record of bushes destroyed. The crew leader will record in a notebook provided for the purpose for each eradication type, (1) all Ribes eradicated by species, (2) hours of work or fractions thereof spent in each type and (3) an estimate of acreage covered in the type. At the end of the day the crew leader will summarize the results of the day's work and hand in his record book to the foreman.

(b) The foreman will keep an accurate record of the progress of the eradication work. Special forms will be provided for this purpose and the work of each crew should be filled in daily. Fill in all information called for on the form.

(c) The camp supervisor will check reports of foremen daily to be sure data are being properly recorded. See "Methods of Performing Ribes Eradication Work in California" for a description of eradication types.

C. Checkers. One checking foreman with the necessary assistants at the approximate rate of one to 25 men will be attached to each camp. Their job is to determine the Ribes conditions after eradication, under the supervision of and responsible to the operation supervisor. However, they are expected to work in close harmony with the camp supervisor.

When an area has been completed to the satisfaction of the foreman and camp supervisor, it will be checked by the regular checkers who will then inform the camp supervisor of the results. If the area, or any parts of it, do not meet the requirements of efficiency, they will be reworked and rechecked until the work is satisfactory. The camp supervisor during his inspection trips can make sample checks which will keep him posted on the quality of work the crews are doing. When reworking is necessary, the results should be added to the end of the general record of the area in such a way as to retain the identity of the reworking figures.

When not engaged in checking, the checkers will be at the disposal of the camp supervisor to assist him in running block boundaries or in other duties he may assign them.

D. Discipline. Crewmen are expected to apply themselves diligently on the job, and to carry out to the best of their ability the instructions of the foreman. Should any man refuse to work or prove to be a nuisance to the organization, the camp supervisor should report him to the proper authority.

CHECKING INSTRUCTIONS
California

A checking foreman with the necessary assistants, at the approximate rate of 1 to 25 blister rust men, will be attached to each blister rust camp. All checking work will be under the general supervision of the operation supervisor.

Checkers will, however, work in close cooperation with the camp supervisor of the camp to which they are attached. When no checking work is needed they will be at the disposal of the camp supervisor.

The checkers will work alone, under the direct supervision of the checking foreman. When a block has been completed, the camp supervisor will inform the checking foreman and provide him with the necessary description of the area to be checked. All stream type in the block should be checked before the upland type. Checking work will be done as follows:

Stream Type

1. A check of not less than 4 percent will be made.

2. The check strip will be 16-1/2 feet wide, 8-1/4 feet on each side of compass line.

3. Course of strip. - The strip will start at the bank of the stream at its lower end at the point where the block boundary crosses it and will run at an acute angle to the outer edge of the stream type. The course determined by compass is then changed to run at an acute angle toward the stream until the creek bank is reached again. If the stream can be readily crossed, the strip is continued from the opposite bank to the limits of stream type on that side. Then an offset is made of a few chains along the stream, depending on width of stream type and percent of check being made, and the creek is recrossed, etc. The strip when finished will form more or less of a zigzag pattern.

   If the stream cannot be readily forded each side will have to be worked separately. A representative sample of the main stream and all of its effluents should be made.

4. Division of strip. - All strips will be divided into transects, each two chains, 132 feet, long; distances determined by pacing. The following data will be secured for each transect:

   (a) The height of the missed Ribes bushes will be recorded in feet and tenths of feet. The height of the bush is the distance from the highest point as it occurs naturally to a horizontal plane which would pass through the base of the stem.

   (b) The number of feet of live stem in the missed bush will be recorded. Live stem is the living stem and branches that appear above the ground. It is measured in linear feet as though the branches were torn apart and placed end to end. The petioles of leaves are not counted as live stem. Live stem must be measured accurately as it is the "measuring stick" for determining the efficiency of the work. For bushes of more than three feet of live stem record only to the nearest foot. For bushes of three feet of live stem or less, record in feet to the nearest tenth.

(c) Missed Ribes bushes are distinguished thusly:

<u>Ribes roezli</u> - plain figures as 1/4
<u>Ribes nevadense</u> - enclosed in parentheses (1/4)
<u>Ribes inerme</u> - enclosed in brackets 1/4
<u>Ribes cereum</u> - enclosed in a circle 1/4
<u>Ribes hallii</u> - enclosed in a square 1/4

Height and feet of live stem should be shown as a fraction with the height above, thus 1/4.

(d) Transects should be numbered consecutively; they should be separated by a large X with the number of the transect appearing at the top.

Upland types

1. A check of not less than 2 percent will be made.

2. The check strip will be 16-1/2 feet wide or 8-1/4 feet on each side of the compass line.

3. Course of strip. - The strips will be run by compass at right angles to the direction followed by the eradication crews; distances determined by pacing. When the section is the unit being checked strips should run in a cardinal direction if possible, offsetting along section lines. The offsets should not be over 12-1/2 chains.

Data are recorded the same as for stream type. The strips for a block are numbered in the order in which they are run. The direction, location, and number of each strip should be designated, (e.g. - Strip 1 - due N. - starting on section line 10 chains west of section corner). Tie in the strips to the opposite section line when possible. Should a return strip be run but no tie-in made for the first strip, state direction and distance between the end of first strip and the starting point of the second strip. The direction and location of each strip will be shown on the map of the area appearing on the back of the checking form.

Special care should be exercised at all times to make certain that all Ribes plants recorded are within the 16-1/2 foot strip being checked. If in doubt, measure the distance by pacing. The pace should be carefully checked at frequent intervals as large errors can be introduced very readily by inaccurate pacing.

It is a good policy to ascertain for a block the number of acres to be checked for both upland and stream types before starting the check. Secure the percent of check to be made from the operation supervisor and from this compute the number of transects needed. Each transect contains 1/20 of an acre. With this knowledge space the strips so as to secure average sampling.

Just as soon as a block has been checked the data should be summarized by types to show:

1. The number of acres in check strips.

2. The total number of bushes and feet of live stem on the check strip by species.

3. The number of bushes missed per acre.

4. The amount of live stem (in feet) missed per acre.

The camp supervisor should promptly be informed of the results of the check.

The boundary of the area requiring reworking can be approximately determined from the location of the missed bushes in the transects. The checkers can assist the foreman by showing the crews to the areas that must be reworked. Areas reworked should be rechecked.

Since the results of the entire job are expressed by the work of the checking men, great care should be exercised in accurately portraying the work. Checkers should be absolutely impartial in their examination of an area. Their whole attention should be directed in getting the facts and in presenting them in their true light to the camp and operation supervisors.

The following are the individual reports prepared by the men as noted:

Ribes Eradication by the Civilian Conservation Corps - T. H. Harris, Junior Forester.

Ribes Eradication by NIRA Camps - W. V. Benedict, Assistant Forester.

Control Reconnaissance in California - F. A. Patty, Assistant Pathologist.

Preeradication - W. V. Benedict, Assistant Forester.

Progress Report of the Sugar Pine Survey of California - W. V. Benedict, Assistant Forester.

RIBES ERADICATION BY THE CIVILIAN CONSERVATION CORPS

By
T. H. Harris
Junior Forester

INTRODUCTION

CCC work made possible the initial eradication of Ribes from some of the best sugar pine stands and sites in the Sierra Nevada as the first step in the establishment of practical control measures in California. At the same time Ribes were again eradicated from two experimental areas set up in previous years.

Blister rust control was in every case only one of a number of projects carried on by each CCC camp. The CCC offered problems unique from the standpoint both of administration of the job and of the methods of work used to meet the special conditions. The result of this was the development of several improvements in methods which promise to be of permanent value and which probably would not have been found so soon had it not been for the type of labor and special problems inherent in the CCC organization.

LOCATION OF WORK

Two important factors determined the selection of the eradication areas, namely: (1) the use of CCC camps, the location of which was already fixed by factors other than blister rust work, and (2) their proximity to good sugar pine stands largely in Federal ownership. Following are brief descriptions of the areas selected: (for more exact locations and for data on the extent of the work at each camp, see the maps appended to this report).

Plumas National Forest

The work at Canyon Dam F-59 in the northwestern part of the forest took in an area southeast of Lake Almanor dam (Canyon Dam) bordering the Greenville-Chester highway and the North Fork of the Feather River. A good stand of sugar pine, gentle to steep topography, moderately abundant Ribes, and a prevalence of brush beneath the timber on parts of the area are typical. Fifty men were employed on blister rust work.

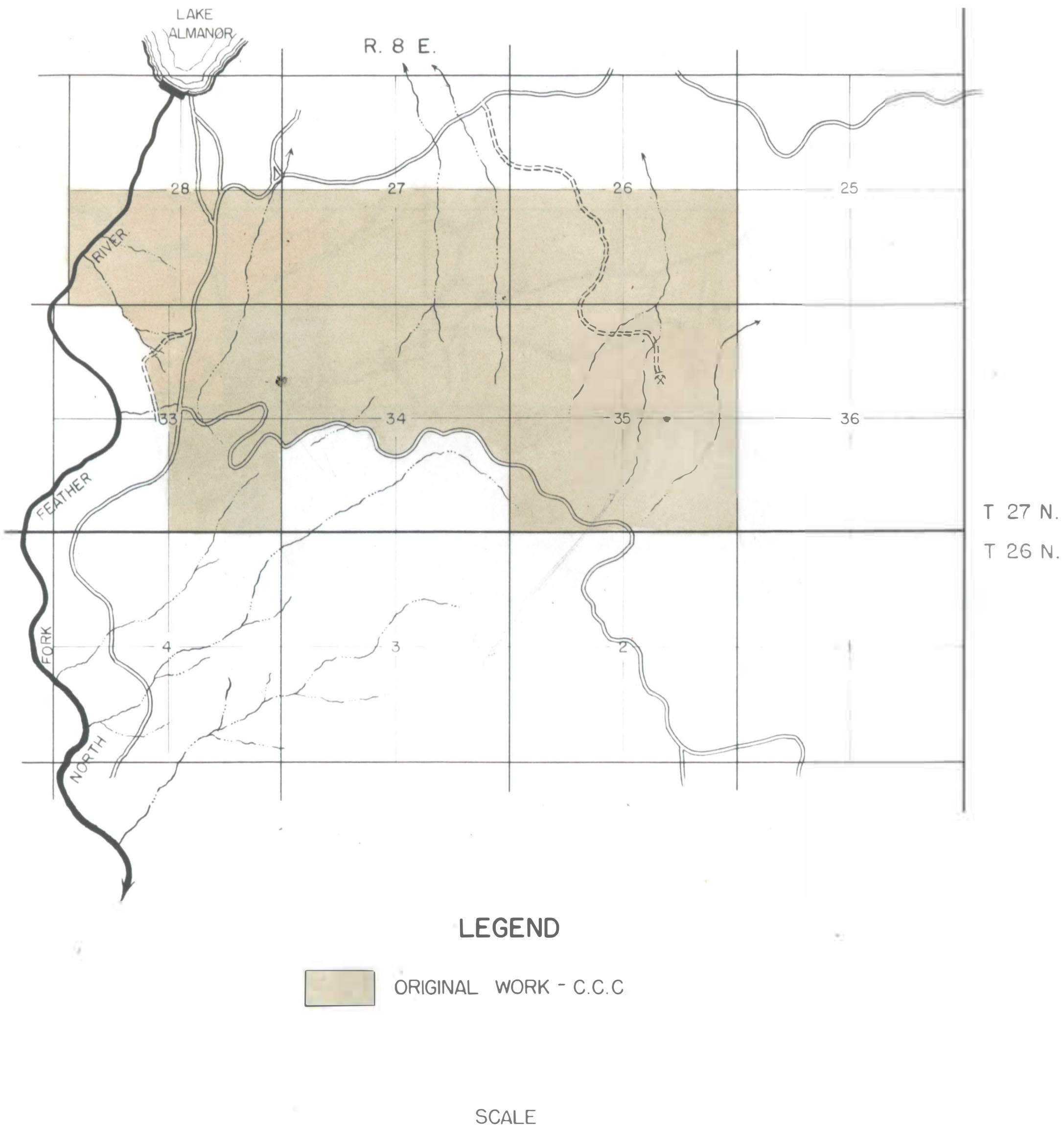
From the Slate Creek camp F-56, five miles west of Quincy, 100 men were engaged in reeradication work on the Meadow Valley experimental area, on which original work was done in 1929, and in initial eradication on adjoining sections. A description of both the area and the original work may be found in the annual report of the Division for 1929.

Eldorado National Forest

The area worked by thirty-five men from the Bear River Camp F-71 is in the vicinity of Lumber Yark Ranger Station north of the Alpine Highway in the drainage of the Middle Fork of the Cosumnes River. Sugar pine of fair quality and numerous Ribes under dense brush are characteristic of the locality.

RIBES ERADICATION AREA

CANYON - DAM UNIT
PLUMAS NATIONAL FOREST
CALIFORNIA

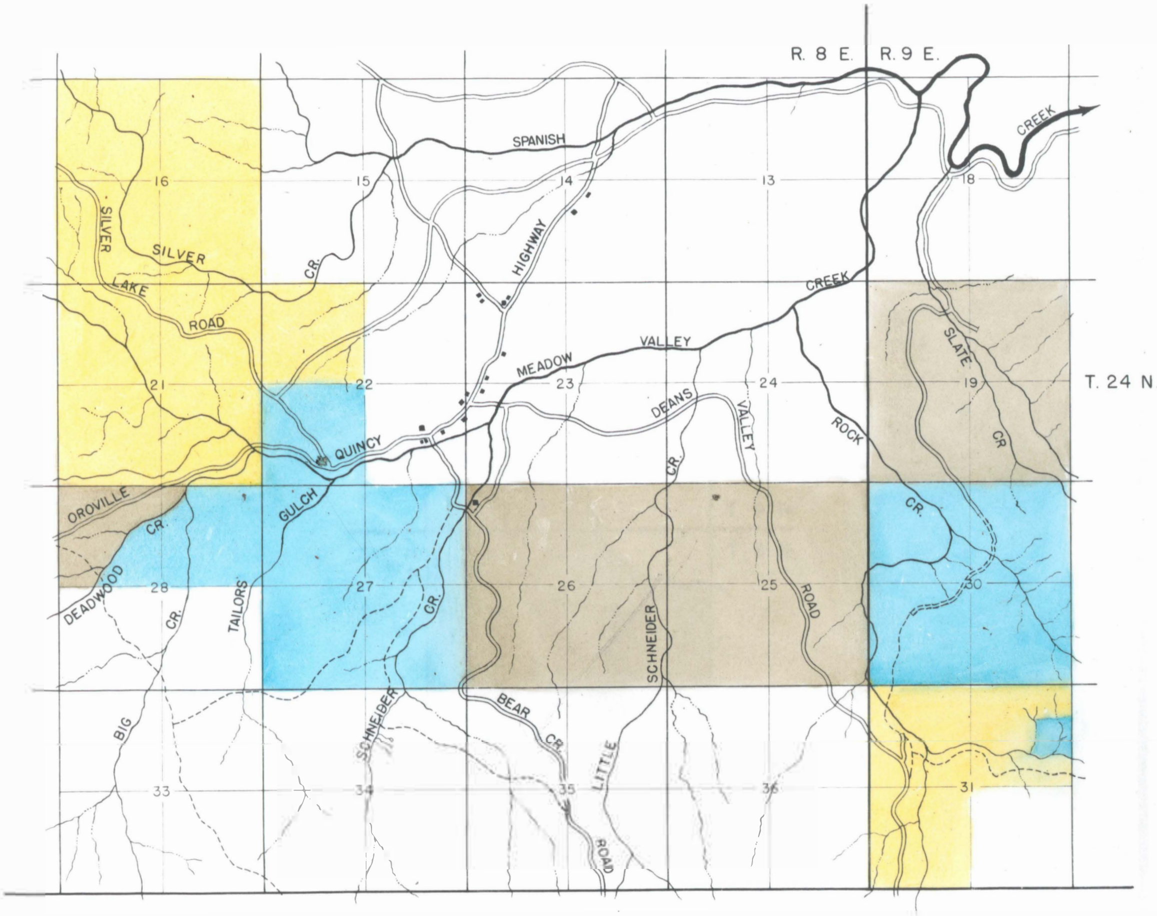


ANNUAL REPORT 1933
T H HARRIS

COMPILED FROM RECONNAISSANCE
& ERADICATION FIELD MAPS
BY A LONDON FEB 1934

RIBES ERADICATION AREA

MEADOW VALLEY UNIT
PLUMAS NATIONAL FOREST
CALIFORNIA



LEGEND

- ORIGINAL WORK - C.C.C.
- REERADICATION - C.C.C.
- PREVIOUS WORK NOT REERADICATED

SCALE

½ ¼ 0 1 MILE

ANNUAL REPORT 1933
T. H. HARRIS

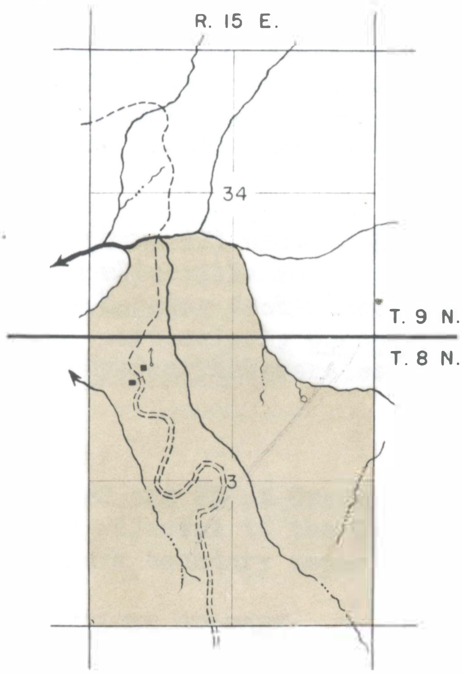
COMPILED FROM RECONNAISSANCE
& ERADICATION FIELD MAPS
BY A. LONDON FEB 1934

RIBES ERADICATION AREA

CAT CREEK UNIT

ELDORADO NATIONAL FOREST

CALIFORNIA



LEGEND

ORIGINAL WORK - C.C.C.

SCALE

½ ¼ 0 1 MILE

ANNUAL REPORT 1933
D. R. MILLER

COMPILED FROM RECONNAISSANCE
& ERADICATION FIELD MAPS
BY A. LONDON FEB. 1934

Stanislaus National Forest

Southeast of the North Fork of the Stanislaus River and contiguous on its southeastern edge to the 1928 experimental area at Dorrington are the sections covered by 25 men from the Dorrington camp F-87. Under a good stand of sugar pine Ribes and brush are light.

Adjoining the 1928 experimental area on the south and in the northern end of the Calaveras Big Trees State Park is another piece of excellent sugar pine type worked by sixteen men of the Big Trees camp S-212. Large numbers of Ribes in dense brush were encountered here.

A description of the general region in which these two camps operated is given in the 1928 annual report.

One hundred and twenty-five men from the Strawberry camp F-85 effected the second reworking of the 1926 and 1927 experimental areas in the vicinity of Strawberry, and extended initial eradication to the east along the North Fork of the Tuolumne River and to the north along the Mono Highway. Descriptions of this locality may be found in the annual reports of the Division for 1926, 1927 and 1930.

Pilot Peak camp F-86 (Camp 17) undertook eradication on cut-over lands near Hazel Green on the Coulterville road. This area once supported an excellent stand of sugar pine. Logging took place about seven years previous, and since then Ribes and brush, particularly Ceanothus sp., have become established in great profusion. Forty-four laborers were available at this camp.

Yosemite National Park

Fifty men from camps #3 and #5 at Crane Flat on the Big Oak Flat road worked mainly on cut-over lands adjacent to the Hazel Green area described in the foregoing paragraph. The park boundary separates the two areas.

METHODS OF WORK

In general the methods of Ribes eradication were the same as those employed in previous years, descriptions of which may be found in the annual reports. However, certain modifications and innovations were developed.

For the first time in the California work foremen, as such, were used, which was the natural outcome of larger operations. One foreman was placed in charge of approximately 25 men who, for purposes of supervision, were concentrated in as small an area as possible without overcrowding, usually not over one-quarter section. Three to five men, and sometimes one man, were used effectively in a crew.

Pilot Peak foremen achieved a successful way of reworking cut-over lands through the use of a one-man crew which seemed particularly adapted to CCC labor. When sent out thus alone the man has a sense of responsibility not felt while in the crew, and naturally the opportunity to stop and talk with

fellow workers is absent. If presented in the proper light he may consider the assignment as one of trust and hence advancement.

Heretofore the customary practice had been to remove Ribes crowns without paying much attention to roots. Past work, however, has shown that even with a good type of labor and a reasonable amount of supervision many crowns are left in the ground, and that even where crowns have been removed sprouting frequently occurs from the fragments of crown left on large roots. In the light of these facts, when it was considered that young, inexperienced and somewhat unreliable labor would have to be used, the criterion was set that all roots down to a depth of eight inches, or all roots larger in diameter than a lead pencil be eradicated.

The consolidation of the eradication types "sugar pine - ponderosa pine", and "sugar pine-fir" into one upland type known as "timber type" was a simplification brought about by the difficulty of training inexperienced man to distinguish between them. In many parts of the Sierra Nevada the differences separating them are not marked and approach a mean, so that the types lose their significance from the eradication standpoint. Hence this has proved to be a very practical step.

It was found necessary in reeradication work to discard the categories of seedlings, sprouts, and missed bushes, here again because the type of labor being used could not learn to apply with reasonable exactness the criteria used in distinguishing them. Live stem counts, however, were kept.

WORK PERFORMED

Initial Eradication

The results of initial eradication by the CCC are presented in Table No. 1.

TABLE NO. 1

INITIAL RIBES ERADICATION BY THE CIVILIAN CONSERVATION CORPS
CALIFORNIA, 1933

Forest	Camp	Eradication Type	Acres	Man Hours			*Man Days	Number of Ribes Pulled					Total Ribes	Ribes Per Acre	Per Man Day		Checking Results	
				Pulling	Other	Total		Ribes roezli	Ribes nevadense	Ribes inerme	Ribes viscosissimum	Ribes cereum			Ribes	Acres	Bu. Per Acre	FLS Per Acre
Plumas	Canyon Dam F-59 50 Men	Timber	2,085	9,227	5,272	14,499	2,071	149,343	18,156		20,167		187,666	90.0	90.6	1.01	3.1	8.4
		Timber Cut-over	175	2,155	780	2,935	419	69,088	14				69,102	394.9	164.9	0.42	3.3	7.3
		Stream	100	1,348	879	2,227	318	19,470	10,861		188		30,519	305.2	95.9	0.31	2.6	6.0
		All Types	2,360	12,730	6,931	19,661	2,808	237,901	29,031		20,355		287,287	121.7	102.3	0.84	3.0	8.2
	Slate Creek F-56 100 Men	Timber	1,502	12,083	4,588	16,671	2,382	49,450	14,010	390			63,850	42.5	26.8	0.63	1.0	3.1
		Timber Cut-over	232	1,602	324	1,926	275	7,048	10,877	287			18,212	78.5	66.2	0.84	1.0	3.1
		Stream	165	2,868	859	3,727	532	7,555	25,754	2,857			36,166	219.2	67.9	0.31	2.0	4.7
		All Types	1,899	16,553	5,771	22,324	3,189	64,053	50,641	3,534			118,228	62.3	37.1	0.59	1.1	3.2
Eldorado	Bear River F-71 35 Men	Timber	774	4,099	1,647	5,747	821	54,620	1,189		1,278		57,087	73.7	69.5	0.94	3.1	12.7
		Stream	34	448	173	620	88	4,518	4,168		33		8,719	256.4	99.1	0.38	4.8	10.5
		All Types	808	4,547	1,820	6,367	909	59,138	5,357		1,311		65,806	81.4	72.4	0.89	3.2	12.6
Stanislaus	Dorrington F-87 25 Men	Timber	2,529	6,184	1,759	7,944	1,132	76,107	3,214				79,321	31.4	70.1	2.23	1.4	6.8
		Brush	20	14		13	2	40					40	2.0	20.0	10.00	1.4	7.2
		Stream	48	286	27	313	45	1,874	3,005				4,879	101.6	108.4	1.07	1.4	1.1
		All Types	2,597	6,484	1,786	8,270	1,179	78,021	6,219				84,240	32.4	71.5	2.20	1.5	6.7
	Big Trees S-212 16 Men	Timber	425	3,248	539	3,787	541	51,097	9,408				60,505	142.4	111.8	0.79	0.8	3.2
		Brush	4	612	103	715	102	8,463	1				8,464	2,116.0	82.9	0.04	**	**
		Stream	25	156	26	182	26	7,977	246				8,223	328.9	316.3	0.96	2.5	0.8
		All Types	454	4,016	668	4,684	669	67,537	9,655				77,192	170.0	115.4	0.68	0.9	3.2
	Strawberry F-85 125 Men	Timber	2,920	24,252	6,521	30,773	4,396	485,529	33,310		3,703	6,747	529,289	181.3	120.4	0.66	3.2	24.2
		Blocked Out Timber	216	15		15	2										1.5	8.5
		Brush	116	303	110	413	59	10,087	1,689			249	12,025	103.6	203.8	1.97	6.7	20.9
		Stream	324	4,306	813	5,119	731	84,576	39,385		778	578	125,317	386.8	171.4	0.44	8.0	19.9
		All Types	3,576	28,876	7,444	36,320	5,188	580,192	74,384		4,481	7,574	666,631	186.4	128.5	0.69	3.8	23.6
	Pilot Peak F-86 44 Men	Timber Cut-over	298	15,143	3,782	18,925	2,703	536,990	19,606				556,596	1,867.8	205.9	0.11	7.8	23.9
		Stream	28	1,546	418	1,964	281	56,101	9,589				65,690	2,346.1	234.0	0.10	10.7	12.9
		All Types	326	16,689	4,200	20,889	2,984	593,091	29,195				622,286	1,908.8	208.5	0.11	8.0	23.0
Yosemite Park	Bridal Veil Crane Flat NPS 3 & 5 50 Men	Timber	230	1,764	757	2,520	360	89,378	3,888				93,266	405.5	259.1	0.64	**	
		Timber Cut-over	210	3,876	1,758	5,634	805	124,245	2,149				126,394	601.9	157.0	0.26	**	
		Stream	31	630	210	840	120	28,123	4,355				32,478	1,047.7	270.9	0.26	**	
		All Types	471	6,270	2,725	8,995	1,285	241,746	10,392				252,138	535.3	196.2	0.37	**	
	Total Eradication	Timber	10,465	60,857	21,083	81,940	11,703	955,524	83,175	390	25,148	6,747	1,070,984	102.3	91.5	0.89	*** 2.3	*** 12.5
		Timber Cut-over	915	22,776	6,644	29,420	4,202	737,371	32,646	287			770,304	841.8	183.3	0.22	1.1	13.1
		Blocked Out Timber	216	15		15	2									108.00	1.5	8.5
		Brush	140	929	213	1,142	163	18,590	1,690			249	20,529	146.6	125.9	0.86	5.9	18.3
		Stream	755	11,588	3,405	14,993	2,141	210,134	97,363	2,857	999	578	311,991	413.2	145.7	0.35	5.2	11.9
		All Types	12,491	96,165	31,345	127,510	18,211	1,921,679	214,874	3,534	26,147	7,574	2,173,808	174.0	119.3	0.69	2.7	12.2

* A seven-hour day.
** No checking done.
*** Total checking results apply to national forest work only.

Annual Report 1933
T. H. Harris

A number of factors in the organization and administration of the CCC operated to the detriment of blister rust control work and account for a lower acreage worked than ordinarily might have been expected. Some of these contributory causes are enumerated below.

In the first place, the situation of the camps was not always central to the scene of eradication operations. This necessitated long truck hauls to and from work which, being considered travel time, was included in the 8-hour work day thus reducing by just so much the hours of actually effective work. Out of the 8-hour day, then, came not only all travel time, but also one hour for lunch, so that the actual number of hours available for productive work might average five, and frequently was less than three. 24.2 percent of the total time (7-hour day excluding lunch hour) was consumed by travel and other non-productive causes. (the average for initial eradication and reeradication). Other sources of list time were sickness, men lost in the woods, mobilization and assignment of men for work, withdrawal of men from the regular crews by the Army for kitchen police, night guard, and other special duties, and numerous other sources ordinarily trifling but here mounting up in the aggregate.

If the first factor, then affecting the output was lost time, the second was the inefficiency of the workers. Lack of interest inthe job, want of incentive, the path of least resistanee which ever led away from Ribes eradication to the more desirable jobs (and few were more difficult than the blister rust assignment), the inexperience and youth of the CCC boys, many of whom did not know how to work, in some cases insufficient and poor food, improper clothing, tools too light for large bushes and rocky ground, inability to pick men or dispose of undesirables--all these did their share to lower the normal standard of work. Of course not all of these factors were operative at every camp, and the intensity with which each was felt likewise varied, and was greatly influenced by the strength and attitude of the camp management.

It is not to be supposed that these difficulties were passibely accepted. Blister rust foremen by persistent efforts and with the cooperation of the Forest Service and the Army in the course of the summer largely overcame some of these obstacles so that the work improved in quality and increased in quantity. Moreover, it must not be overlooked that many of the CCC boys were honest workers whose industry was beyond reproach and a credit to the organization.

To illustrate one instance of overcoming apathy: A foreman, to create interest, held fortnightly contests, the winners of which were rewarded with a Sunday automobile trip to some point of interest in the surrounding country. The contests were based solely on the thoroughness of the individual bush and root eradication, demerits being debited for every improperly eradicated bush recorded by the checker. Surprising results were obtained by this simple means. In fact so effective is it that if it is used in the future care should be exercised that too much time be not spent in digging for roots.

Reeradication

The results of a first Ribes reeradication at Meadow Valley on the Plumas National Forest, and a second reeradication at Strawberry on the Stanislaus are given in table 2.

TABLE NO. 2

REERADICATION BY THE CIVILIAN CONSERVATION CORPS
CALIFORNIA, 1933

Forest	Camp	Eradication Type	Acres	Man Hours			Man Days	Number of Ribes Pulled												Per Acre		Per Man Day			Checking Results	
								R. roezli		R. nevadense		R. inerme		R. viscosissimum		R. cereum		Total Ribes								
				Pulling	Other	Total		Bushes	Feet Live Stem	Bushes	Feet Live Stem	Bushes	Feet Live Stem	Bushes	Feet Live Stem	Bushes	Feet Live Stem	Bushes	Feet Live Stem	Bushes	Feet Live Stem	Bushes	Feet Live Stem	Acres	Bushes Per Acre	FLS Per Acre
Plumas	Slate Creek	Timber	1,513	9,494	3,682	13,176	1,882	18,879	122,219	4,968	39,830	59	561					23,906	162,610	15.8	108	12.7	86	0.80	1.6	5.2
		Timber Cut-over	118	318	91	409	58	2,209	18,093	475	1,584	137	3,845					2,821	23,522	23.9	199	48.6	405	2.03	1.6	5.2
		Stream	89	1,174	455	1,629	233	1,435	6,396	4,836	22,062	232	1,207					6,503	29,665	73.1	333	27.9	127	0.38	6.4	22.5
		All Types	1,720	10,986	4,228	15,214	2,173	22,523	146,708	10,279	63,476	428	5,613					33,230	215,797	19.3	126	15.3	99	0.79	1.8	6.0
Stanislaus	Strawberry	Timber	2,527	7,991	1,653	9,644	1,378	75,947	960,654	10,172	29,403			65	665	112	2,266	86,296	992,987	34.1	393	62.6	721	1.83	1.6	9.4
		Brush	515	3,667	876	4,543	649	29,775	219,563	7,558	23,991			30	186	85	3,199	37,448	246,939	72.7	479	57.7	381	0.79	1.9	9.6
		Blocked Out Timber	860	44		44	6																		1.0	12.1
		Stream	278	1,475	306	1,781	254	17,971	266,672	13,381	38,441			24	93	56	287	31,432	305,494	113.3	1,101	123.5	1,201	1.09	3.2	9.0
		All Types	4,180	13,177	2,835	16,012	2,287	123,693	1,446,889	31,111	91,835			119	944	253	5,752	155,176	1,545,420	37.1	370	67.8	676	1.83	2.0	9.3
	Total Reeradication	Timber	4,040	17,485	5,335	22,820	3,260	94,826	1,082,873	15,140	69,233	59	561	65	665	112	2,266	110,202	1,155,597	27.2	286	33.8	354	1.23	1.6	7.8
		Timber Cut-over	118	318	91	409	58	2,209	18,093	475	1,584	137	3,845					2,821	23,522	23.9	199	48.6	405	2.03	1.6	5.2
		Brush	515	3,667	876	4,543	649	29,775	219,563	7,558	23,991			30	186	85	3,199	37,448	246,939	72.7	479	57.7	380	0.79	1.9	9.6
		Blocked Out Timber	860	44		44	6																	143.30	1.0	12.1
		Stream	367	2,649	761	3,410	478	19,406	273,068	18,217	60,503	232	1,207	24	93	56	287	37,935	335,159	103.4	913	77.8	668	0.75	3.9	12.2
		All Types	5,900	24,163	7,063	31,226	4,460	146,216	1,593,597	41,390	155,311	428	5,613	119	944	253	5,752	188,406	1,761,217	31.9	299	42.2	395	1.32	1.9	8.3

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The facts brought out by the comparisons in Table No. 3 need little elucidation. Lack of time prevented the covering of the entire area so that the acreage shown for 1933 is less than that for 1929. The CCC seven-hour (lunch time excluded) man-day was converted into an eight-hour day for the purpose of reducing to a comparable basis for the two areas the acres and Ribes per man-day. In the four years following the initial work of 1929, Ribes had come back only to the extent of 19.3 bushes to the acre. In spite of the reduction in the number of bushes the acres per man-day diminished in 1933; the discussion of CCC labor and problems in the foregoing paragraphs will suffice to explain this apparent anomaly.

TABLE NO. 3

COMPARISION OF RIBES REERADICATION WITH INITIAL ERADICATION ON THE MEADOW VALLEY EXPERIMENTAL AREA, PLUMAS NATIONAL FOREST, CALIFORNIA

PART A. COMPARISON BY SECTIONS AND TYPES

Section	Eradication Type	Total Acres		Acres per Man Day		Ribes per Acre		Ribes per Man Day		R. roezli % of Total		R. nevadense % of Total		R. inerme % of Total	
		1929	1933	1929	1933	1929	1933	1929	1933	1929	1933	1929	1933	1929	1933
22	Timber	40.0	73.0	2.0	2.3	90.9	9.2	181.8	21.1	70.7	67.3	29.3	23.9	-	8.8
22	Cut-over	260.0	100.0	5.6	4.2	25.0	9.3	140.0	39.1	93.0	84.2	7.0	1.2	-	14.6
22	Stream	30.0	7.0	0.6	0.8	591.1	93.4	354.7	74.7	13.4	4.6	20.3	59.9	66.3	35.5
27	Timber	615.0	617.0	2.3	1.2	86.9	15.7	199.9	18.8	79.5	82.6	20.5	17.4	-	-
27	Stream	25.0	23.0	0.5	0.4	446.4	73.6	223.2	29.4	24.3	31.0	66.6	69.0	9.1	-
28	Timber	258.7	223.0	1.4	1.2	150.0	29.8	210.0	35.7	67.0	74.0	33.0	26.0	-	-
28	Stream	26.3	18.0	0.3	0.6	470.3	139.4	141.0	83.6	28.0	18.0	72.0	82.0	-	-
30	Timber	603.1	600.0	3.3	1.2	97.3	15.0	321.0	18.0	85.0	79.0	15.0	21.0	-	-
30	Stream	36.9	40.0	1.4	0.8	142.4	36.9	199.3	29.5	38.0	26.0	62.0	74.0	-	-
31	Timber	399.1	18.0	1.8	3.0	190.3	6.9	342.5	20.7	90.0	88.0	10.0	12.0	-	-
31	Stream	27.9	1.0	0.7	0.3	461.3	171.0	322.0	51.3	61.0	34.0	39.0	66.0	-	-
Totals or Averages		2,3220	1,7200	1.98	1.25	117.7	19.3	233.0	24.1	71.0	68.0	24.0	31.0	5.0	1.0

PART B. COMPARISON OF SUMMARIZED TYPES

Timber	1915.9	1531.0	2.18	1.43	108.2	16.8	235.8	24.0	82.0	79.0	18.0	21.0	-	-
cut-over	260.0	100.0	5.67	4.20	25.0	9.3	141.7	39.1	93.0	84.2	7.0	1.2	-	14.6
Stream	146.1	89.0	0.56	.60	406.4	73.0	227.5	43.0	31.0	22.0	47.0	74.0	22.0	4.0
Totals or Averages	2322.0	1720.0	1.98	1.25	117.7	19.3	233.0	24.1	71.0	68.0	24.0	31.0	5.0	1.0

TABLE NO. 4

COMPARISON OF INITIAL RIBES ERADICATION WITH REERADICATIONS AT STRAWBERRY, STANISLAUS NATIONAL FOREST

Section	Eradication Type	Total Acres 1926 1927	Total Acres 1930	Total Acres 1933	Acres per Man Day 1926 1927	Acres per Man Day 1930	Acres per Man Day 1933	Ribes per Acre 1926 1927	Ribes per Acre 1930	Ribes per Acre 1933	Ribes per Man Day 1926 1927	Ribes per Man Day 1930	Ribes per Man Day 1933	Feet of Live Stem per Acre 1930	Feet of Live Stem per Acre 1933
9	Cut-over	343.6	343.6	350.6	5.9	9.4	6.0	56.1	28.0	7.8	329.8	264.1	47.2	401.1	No data
	Stream	16.5	16.5	9.5	2.1	4.4	2.0	624.7	149.9	145.6	1,288.4	642.1	291.4	558.7	No data
10	Cut-over	369.1	369.1	252.5	10.8	57.0	5.1	5.1	3.5	7.8	55.1	200.8	39.5	53.6	No data
	Stream	23.5	23.5	32.5	2.3	1.8	4.3	77.4	183.1	15.1	175.9	324.0	65.2	448.0	No data
16	Timber	606.4	606.4	589.5	7.4	18.1	24.7	11.7	5.3	2.5	86.2	96.4	62.5	96.8	58.4
	Stream	33.6	33.6	50.5	1.5	3.3	4.8	72.1	26.8	3.0	105.8	87.5	14.7	108.6	38.8
17	Timber	622.1	622.1	631.3	3.0	9.4	3.2	46.4	17.0	11.9	137.0	159.7	37.8	227.1	172.1
	Stream	6.0	6.0	8.7	1.5	3.3	1.5	72.5	27.0	161.4	106.0	87.9	234.0	109.0	No data
18	Cut-over	216.1	216.1	216.1	1.3	4.6	3.2	103.8	35.1	*8.2	139.6	161.8	16.4	382.0	*312.0
19	Timber	562.9	562.9	585.0	2.9	10.4	1.8	62.2	16.6	30.8	181.5	173.3	53.9	152.0	545.0
	Stream	9.5	9.5	15.0	.3	2.1	.2	481.4	333.7	519.7	162.0	705.5	106.8	484.3	9,844.0
20	Timber	446.0	446.0	565.0	3.1	5.4	1.8	35.7	49.8	42.4	112.4	450.0	88.3	130.4	451.3
	Stream	9.0	9.0	20.0	1.5	1.3	1.8	89.4	563.0	56.0	138.0	1,109.4	113.3	468.0	398.8
21	Timber	595.0	595.0	610.0	10.1	14.9	5.6	16.2	9.5	6.3	163.8	141.6	35.4	35.0	62.2
	Stream	35.0	35.0	20.0	5.4	15.6	2.8	23.0	5.3	12.0	123.7	82.7	33.1	65.3	54.0
28	Timber	292.0	227.0	200.0	3.6	43.2	1.1	30.1	4.7	115.4	106.3	569.5	131.2	13.1	718.0
	Stream	83.0	83.0	65.0	1.6	5.1	1.4	107.5	175.6	133.9	169.8	905.1	193.4	142.0	1,317.9
	Brush	265.0	265.0	295.0	1.5	3.7	0.9	91.7	36.9	63.4	133.4	135.0	55.6	193.7	294.9
29	Timber	263.0	271.0	258.0	7.4	9.3	1.9	12.6	11.0	42.7	93.1	102.4	84.4	122.0	327.2
	Stream	130.0	100.0	107.0	0.9	3.9	1.4	140.9	92.1	125.4	127.7	362.8	174.7	217.3	571.5
	Brush	247.0	269.0	275.0	2.5	28.6	1.2	37.9	10.1	68.2	95.4	266.5	80.5	22.0	581.5
Total	Timber	3,387.4	3,330.4	3,438.8	4.2	12.0	2.8	32.1	17.1	25.9	135.0	205.5	71.5	120.3	285.7
	Cut-over	928.8	928.8	819.2	3.7	10.3	6.5	46.9	19.9	7.9	172.1	206.1	51.1	258.6	82.3
	Stream	346.1	316.1	328.2	1.2	3.9	1.4	139.9	126.5	105.8	171.7	487.8	144.2	217.2	930.8
	Brush	512.0	534.0	570.0	1.8	6.5	1.0	65.7	23.0	65.7	120.1	150.1	65.8	107.2	433.2
Grand Total		5,174.3	5,109.3	5,156.2	3.2	9.6	2.4	45.3	32.2	32.5	144.6	309.8	76.9	150.0	310.8

*Figures estimated

Table No. 4 presents a comparison by sections similar to that in Table No. 3 of initial eradicative work at Strawberry with succeeding reeradication.

Table No. 5 aims to compare, in a summary way, the 1933 reeradication at Strawberry with previous work. Although the percentage of bush increase over the number found in 1930 is negligible, the increase in live stem is 52 per cent. Part of the large increase in live stem is due to the sprouting of crowns left in 1930, and part to the favorable conditions for growth offered by the logged-over land.

TABLE NO. 5 - COMPARISON OF THE 1933 REERADICATION WITH PREVIOUS WORK AT STRAWBERRY, STANISLAUS NATIONAL FOREST

Acres Covered			Bushes Pulled Per Acre					Ft. of Live Stem Eradicated Per Acre		
1926 & 1927 initial Erad.	1930 Reerad.	1933 Reerad.	1926 & 1927 initial Erad.	1930 re-erad.	1933 Re-erad.	% Decrease 1930 Re-erad. over initial Erad.	% Increase 1933 Reerad. over 1930 Re-erad.	1930 Re-erad.	1933 re-erad.	% of increase
5,174.3	5,109.3	5,156.2	45.3	32.2	32.5	29	1	150.0	310.8	52

CHECKING

One or more men at each camp handled the checking of eradication work by methods essentially the same as those of previous years. Complete written instructions were given each checker, which may be referred to if further information is desired regarding methods.

The standard of efficiency for Ribes eradication was set at 25 feet of live stem or three bushes per acre, and this standard was maintained throughout except where the closing down of operations prevented reworking.

COSTS

It is impossible at this time to compute the actual cost of blister rust control work done by the CCC. Several Government agencies were involved in some phase of its administration and the general nature of the program renders it extremely difficult to prepare an accurate cost statement for a particular line of work.

A fairly reliable estimate of the cost of supervision and special equipment paid from Emergency Conservation Funds, which are directly chargeable to blister rust control are enumerated in Table No. 6.

TABLE NO. 6

ESTIMATED COST OF TECHNICAL ADMINISTRATION OF ECW BLISTER RUST WORK, 1933

		*B.R.C. Funds		Salaries of Blister Rust Supervision			Special B.R.C. Equipment			
Area	Camp	Salaries	Expense Accounts and Truck Operation	Foremen	Checkers	Reconnaissance	Tools	Twine	Misc. Equipment and Supplies	Total Cost
Stanislaus N.F.	Pilot Peak (F-86)	$ 527.00	$ 140.10	$1,230.00	$ 513.00	$337.00	$ 48.02	$ 97.00	$ 35.07	$ 2,927.19
	Strawberry	831.00	189.10	2,915.00	1,387.00	-	144.06	290.00	80.64	5,836.80
	Calaveras Big Trees	273.00	71.15	297.00	-	-	24.09	48.00	21.67	734.91
	Dorrington	289.00	150.10	567.00	375.00	-	24.09	48.00	22.35	1,475.54
Eldorado N.F.	Bear River	281.00	134.14	706.00	371.00	96.00	48.02	97.00	35.07	1,768.23
Plumas N.F.	Canyon Dam	341.00	154.05	1,477.00	338.00	75.00	48.02	97.00	35.07	2,565.14
	Slate Creek	574.00	154.05	2,288.00	834.00	-	96.04	194.00	53.71	4,193.80
Yosemite N.P.	Camps 3 and 5	356.00	94.11	150.00	-	-	72.11	25.00	-	697.22
Totals		$3,472.00	$1,086.80	$9,630.00	$3,818.00	$508.00	$504.45	$896.00	$283.58	$20,198.83

*Paid from regular funds; other expenses paid by Forest Service from ECW funds.
Basic pay indicated; subtract 15 percent from above salary figures to obtain actual salary paid.

For the purpose of evaluating the blister rust accomplishments of the CCC, the results obtained are appraised in Table No. 7 as well as compared with NIRA work done during the same season. The appraisal is based on results and costs of similar work done this season by NIRA crews. The man hours actually spent on the job, as shown in tables No. 1 and 2 are converted into 8-hour man days in order to be directly comparable to NIRA work.

TABLE NO. 7

COMPARISON OF CCC WITH NIRA WORK

Class of Work	Totals: Man Days Worked	Totals: Acreage Covered	Totals: Ribes Eradicated	Totals: Cost	Per Acre Basis: Ribes	Per Acre Basis: Cost	Man Day Basis: Ribes	Man Day Basis: Acres
CCC	15,041	18,391	2,362,214	$87,394.78*	128	*$4.75	157	1.22
NIRA	13,071	21,324	3,298,975	$75,948.22	155	$3.56	252	1.63

*The average man day cost of the NIRA work amounted to $5.81. On the basis of 15,041 eight-hour man days of CCC labor, the hypothetical cost of the CCC work is $87,394.78 or $4.75 per acre.

From the foregoing table it is figured that the production of NIRA crews, for areas averaging 17 per cent more Ribes and on which working conditions are more or less similar, is greater than CCC by 38 per cent for Ribes eradicated and 25 per cent for acreage covered and costs. This comparison is based on an 8-hour work day for each. The NIRA crews actually put in an 8-hour work day and the average work day delivered by the CCC was 5.3 hours.

RIBES ERADICATION BY NIRA CAMPS

by

W. V. Benedict
Assistant Forester

INTRODUCTION

In late August word was given to start in California under authority of the National Industrial Recovery Act a relatively large Ribes eradication operation. Accordingly, under the direct supervision of the Division of Blister Rust Control, one seventy-five-man, six fifty-man, and two twenty-five-man camps were established early in September on the Stanislaus National Forest. Two months later snows forced them to close down. The restriction of operations to one forest was dictated by the lateness of the season coupled with the greater case of administration with the few experienced men available. The Stanislaus was selected because of the presence there of a majority of blister rust personnel supervising CCC work which could not very well be left unattended.

LOCATION OF WORK

Three camps operated on the borders of the Dorrington eradication area further extending the CCC work described in the foregoing pages. The Hayward Creek camp extended operations to the north, Big Trees worked to the south around the state park, and the third camp worked in the Beaver Creek drainage southeast of the North Fork of the Stanislaus River. Larger numbers of Ribes and denser undergrowth were found than had previously been encountered in this locality.

Four camps in the vicinity of Strawberry worked lands bordering the experimental area and the CCC operation, and succeeded in covering all the remaining sugar pine type of commercial importance in townships 4 and 5 north, range 18 east.

One camp at Hazel Green continued eradication on lands adjacent to those worked by the Pilot Peak and Crane Flat CCC, and another on North Crane Creek extended the worked area northward. Although dense Ribes, brush, and steep topography were the rule on the Hazel Green cut-over lands, the reverse was true of the virgin stands of North Crane Creek where considerable Ribes-free ground was blocked out.

For further descriptions of these localities see the accompanying maps and the CCC section of this report.

METHODS OF WORK

The methods of Ribes eradication followed in NIRA work were generally the same as those applied in former work and by the CCC.

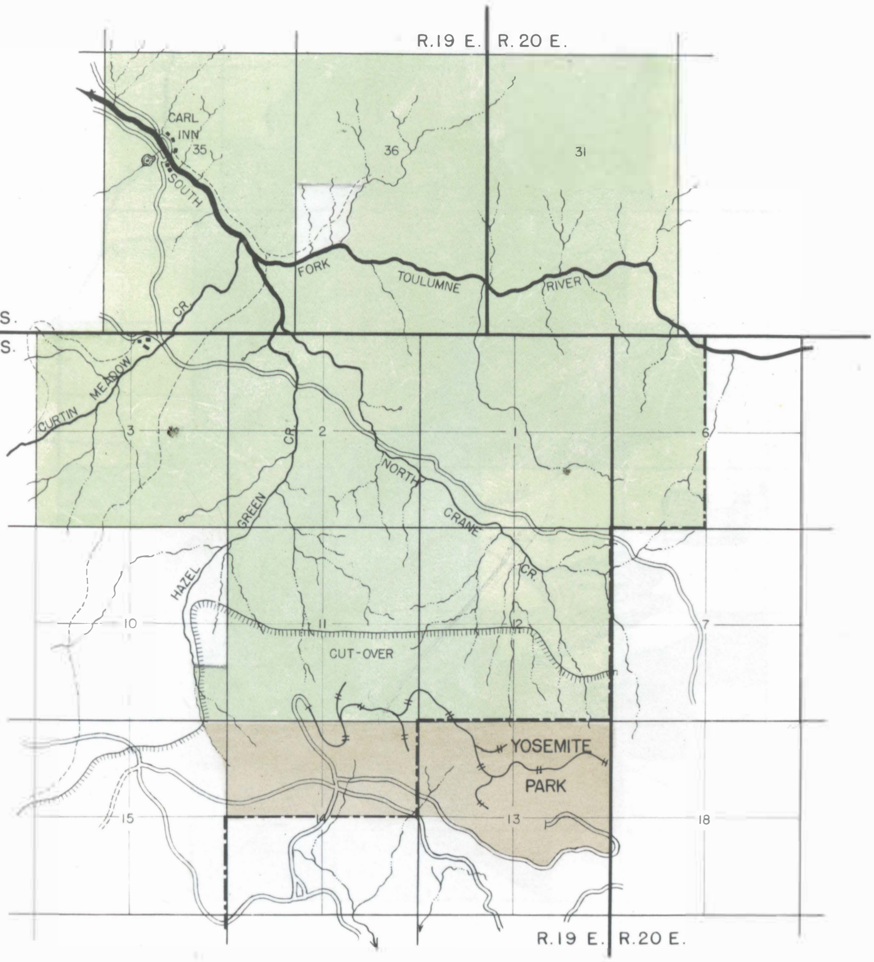
The Hazel Green camp developed for cut-over lands with a heavy Ribes population a system of assigning crews to lanes along which string lines had already been laid. By releasing the string man in the crew for pulling duties alone it increases the effective work of the crew. String lanes are straight and more uniform since they are run by one man whose attention is not divided

RIBES ERADICATION AREA

HAZEL GREEN UNIT

STANISLAUS NATIONAL FOREST

CALIFORNIA



LEGEND

ORIGINAL WORK - N.I.R.A.

ORIGINAL WORK - C.C.C.

BOUNDARY OF CUT-OVER TYPE

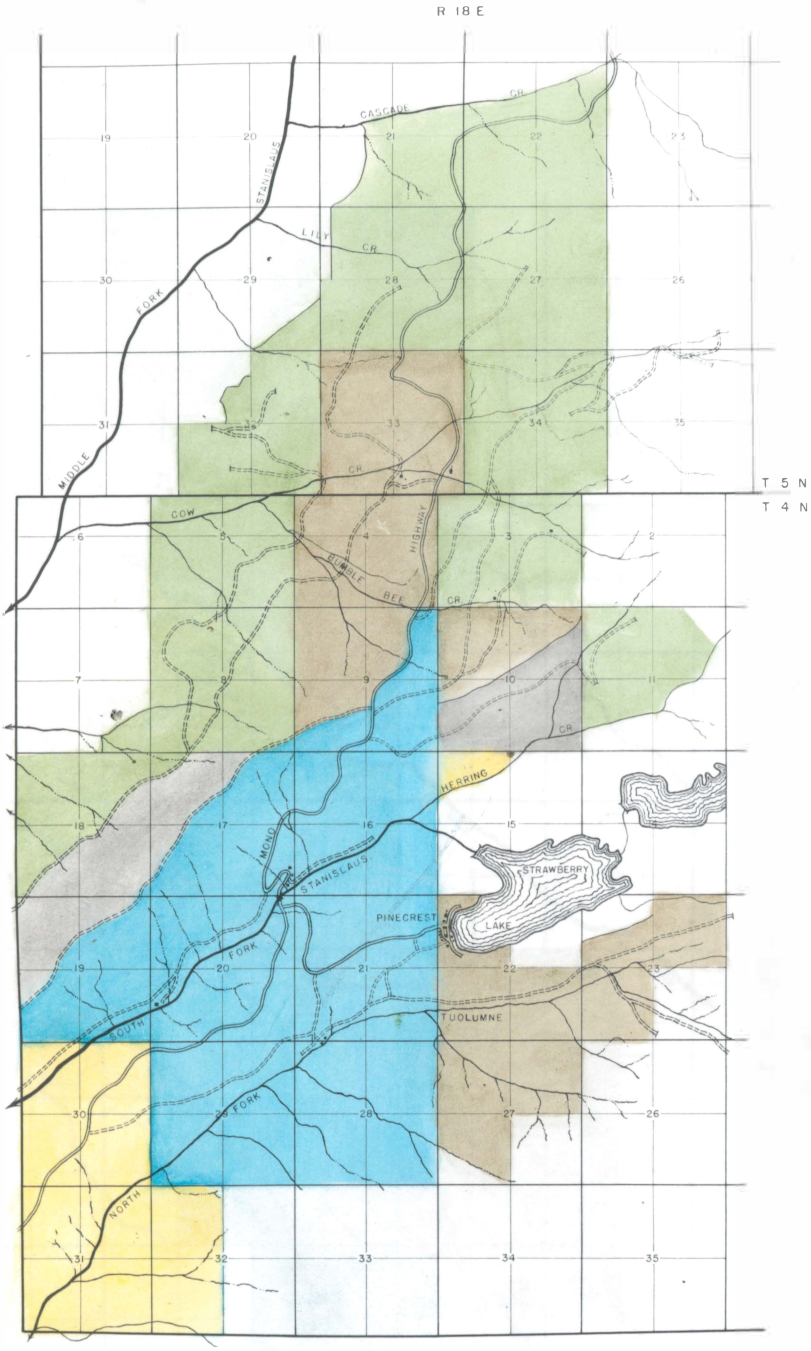
YOSEMITE NATIONAL PARK BOUNDARY

SCALE

½ ¼ 0 1 MILE

ANNUAL REPORT 1933
F A [illegible]ATTY

COMPILED FROM RECONNAISSANCE
& ERADICATION FIELD MAPS
BY A [illegible]ONDON FEB 1934



RIBES ERADICATION AREA

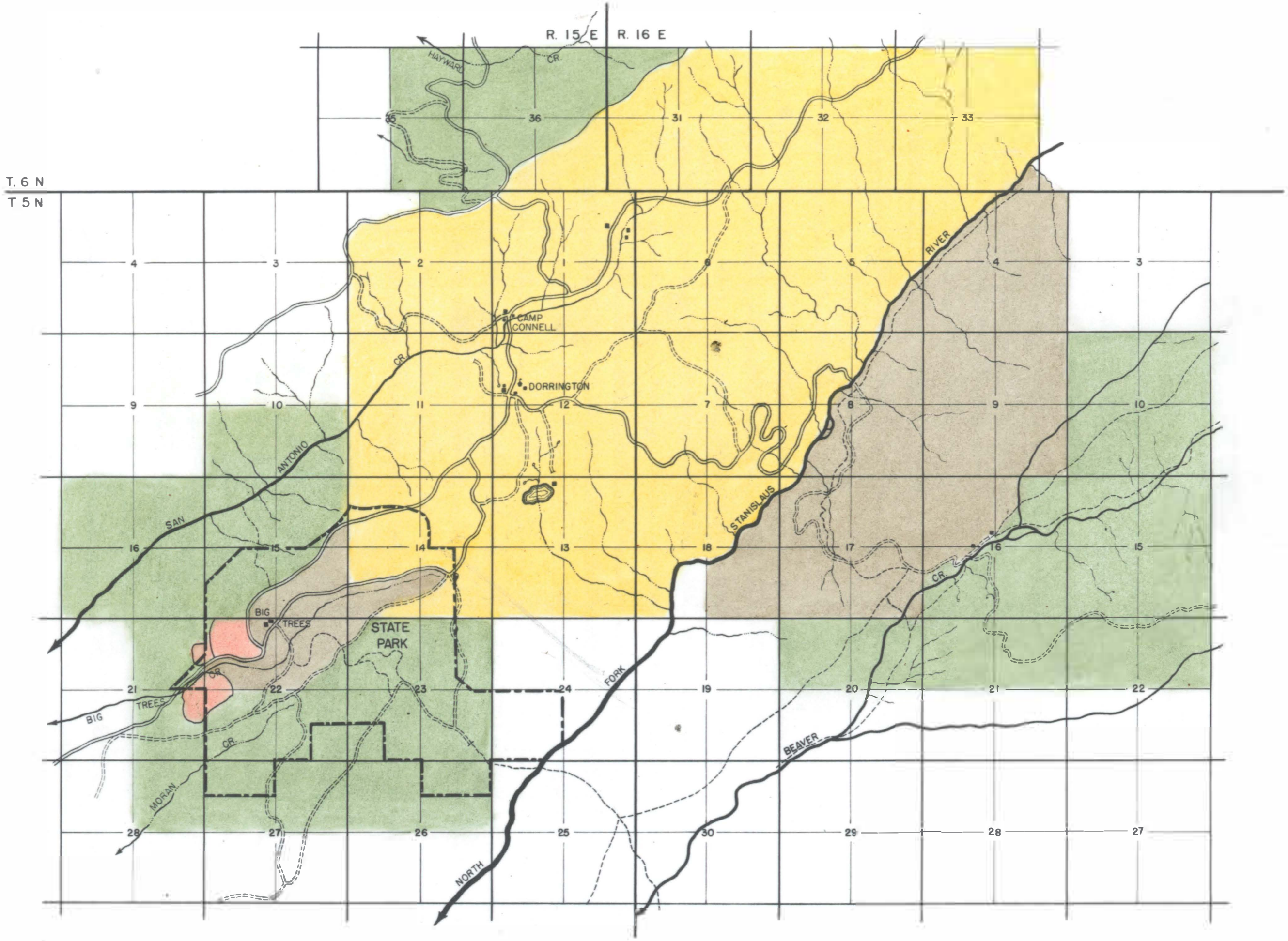
STRAWBERRY UNIT
STANISLAUS NATIONAL FOREST
CALIFORNIA

LEGEND

- ORIGINAL WORK - N.I.R.A.
- ORIGINAL WORK - C.C.C.
- REERADICATION - N I R A
- REERADICATION - C C C
- PREVIOUS WORK NOT REERADICATED

SCALE

COMPILED FROM RECONNAISSANCE
& ERADICATION FIELD MAPS
BY A LONDON FEB 1934



RIBES ERADICATION AREA

DORRINGTON UNIT

STANISLAUS NATIONAL FOREST

CALIFORNIA

SCALE

½ ¼ 0 1 MILE

LEGEND

- ORIGINAL WORK - N.I.R.A.
- ORIGINAL WORK - C.C.C.
- BRUSH TO BE WORKED
- PREVIOUS WORK NOT REERADICATED
- BOUNDARY OF CALAVERAS BIG TREES STATE PARK

ANNUAL REPORT 1933
D. R. MILLER

COMPILED FROM RECONNAISSANCE
& ERADICATION FIELD MAPS
BY A. LONDON FEB 1934

TABLE NO. 1
INITIAL RIBES ERADICATION ON THE STANISLAUS NATIONAL FOREST
NIRA WORK 1933

Camp	Eradication Type	Acres	Man Days	Number of Ribes Pulled: R. roezli	R. nevadense	R. viscosissimum	R. cereum	Total Ribes	Ribes Per Acre	Per Man Day: Ribes	Per Man Day: Acres	Costs: Type	Costs: Acre	Checking Results*: Bushes Left Per Acre	Checking Results*: Average Feet of Live Stem Left Per Acre
Beaver Creek 50 Men	Timber	2,612	1,469	215,337	2,549			217,886	83.4	148.3	1.78	$ 8,679.75	$3.32	2.0	6.5
	Stream	113	136	16,738	4,811			21,549	190.7	158.0	0.83	803.58	7.11	3.5	2.9
	All Types	2,725	1,605	232,075	7,360			239,435	87.9	149.2	1.70	9,483.33	3.48	2.1	6.3
Hayward Creek 25 men	Timber	807	381	77,694	1,208			78,902	97.8	207.1	2.12	2,336.04	2.89	4.1	11.2
	Timber Cut Over	277	444	222,167	548			222,715	804.0	501.6	0.62	2,722.31	9.83	5.2	12.4
	Stream	25	27	2,847	1,203			4,050	162.0	150.0	0.93	165.56	6.62	1.3	2.1
	All Types	1,109	852	302,708	2,959			305,667	275.6	358.8	1.30	5,223.91	4.71	4.3	11.2
Big Trees 50 men	Timber	3,585	1,633	279,511	4,417			283,928	79.2	173.9	2.20	9,055.19	2.53	1.7	4.7
	Brush	10	39	3,925				3,925	392.5	100.6	0.25	216.27	21.63		
	Stream	67	67	14,710	3,702			18,412	274.8	274.8	1.00	371.53	5.55	2.9	3.1
	All Types	3,662	1,739	298,146	8,119			306,265	83.6	176.1	2.10	9,642.99	2.63	1.8	4.7
Fiddlers Green 25 men	Timber Cut Over	1,058	689	127,000	9,687	51	665	137,403	130.0	199.0	1.54	4,126.36	3.90	2.1	14.2
	Timber Blocked out	130	2									11.98	0.09		
	Stream	109	152	25,107	15,462		102	40,671	373.1	267.6	0.72	910.31	8.35	6.9	13.3
	All Types	1,297	843	152,107	25,149	51	767	178,074	137.3	211.2	1.54	5,048.65	3.89	2.3	12.7
Cow Creek 75 men	Timber	172	65	4,945	3,641	346	601	9,533	55.4	147.0	2.65	366.95	2.13	1.4	8.9
	Timber Cut Over	1,432	1,865	468,480	11,225	44,729	11,185	535,619	374.0	287.2	0.77	10,528.52	7.35	4.9	33.3
	Brush	39	37	3,715	238		46	3,999	102.5	108.1	1.05	208.89	5.36	checked with timber	
	Stream	51	122	23,015	6,947	1,061	340	31,363	615.0	257.1	0.42	688.74	13.50	3.1	9.9
	All Types	1,694	2,089	500,155	22,051	46,136	12,172	580,514	343.0	278.0	0.81	11,793.10	6.96	4.4	29.3
Bumble Bee 50 men	Timber Cut Over	1,885	966	177,489	2,023	5	8	179,525	95.2	186.0	1.95	5,657.68	3.00	3.5	28.9
	Timber Blocked out	480	5									29.28	0.06	0.1	3.2
	Stream	275	248	49,665	9,323		2	58,990	214.5	238.0	1.11	1,452.50	5.28	5.2	25.1
	All Types	2,640	1,219	227,154	11,346	5	10	238,515	90.3	196.0	2.16	7,139.46	2.70	3.0	23.3
Lily Creek 50 men	Timber	945	308	41,602	2,069	1,806	2,017	47,494	50.3	154.2	3.07	1,843.00	1.95	4.6	25.7
	Timber Cut Over	1,094	985	245,958	15,666	38	3,495	265,157	242.4	369.2	1.11	5,894.01	5.39	5.9	38.7
	Timber Blocked out	34	1									5.98	0.18		
	Stream	66	64	10,976	5,318	58	154	16,506	250.0	25[illegible].0	1.03	382.95	5.80	6.3	59.1
	All Types	2,139	1,358	298,536	23,053	1,902	5,666	329,157	154.0	242.4	1.57	8,125.94	3.80	5.2	33.0
North Crane Creek 50 men	Timber	4,079	1,357	230,690	15,453			246,143	60.3	181.4	3.01	7,964.48	1.95	9.8	1.9
	Timber Blocked out	871													
	Stream	409	239	33,970	13,785			47,755	116.8	199.8	1.71	1,402.74	3.43	8.9	3.0
	All Types	5,359	1,596	264,660	29,238			293,898	54.8	184.1	3.36	9,367.22	1.75	9.7	2.0
Hazel Green 50 men	Timber Cut Over	674	1,657	735,493	38,734			774,227	1,149.0	467.2	0.41	9,477.33	14.06	66.0	[illegible]
	Stream	25	113	28,969	24,254			53,223	2,129.0	471.0	0.22	646.29	25.85	[illegible]	[illegible]
	All Types	699	1,770	764,462	62,988			827,450	1,183.8	467.5	0.40	10,123.62	14.48	68.2	428.9
Totals All Camps 425 men	Timber	12,200	5,213	849,779	29,337	2,152	2,618	883,886	72.5	169.6	2.34	30,289.76	2.48	4.9	6.3
	Timber Cut Over	6,420	6,606	1,976,587	77,883	44,823	15,353	2,114,646	329.4	320.1	0.97	38,383.65	5.98	10.6	70.4
	Timber Blocked out	1,515	8									46.49	0.03		1.0
	Brush	49	76	7,640	238		46	7,924	161.7	104.3	0.64	441.66	9.01		
	Stream	1,140	1,168	205,997	84,805	1,119	598	292,519	256.6	250.4	0.98	6,786.66	5.95	8.9	22.2
	[illegible] Total All Types	21,324	13,071	3,040,003	192,263	48,094	18,615	3,298,975	154.7	252.4	1.63	$75,948.22	$3.56	6.9	26.0

* Checking results in several instances are approximate only since figures for parts of types, being considered representative of the type, have been applied to the whole. Checking work was not completed when the camps shut down.

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W. V. Benedict

among other tasks.

Some of the camps continued to advantage the use of the 1-man crew for rework jobs.

The working day was eight hours and all travel was done on the men's own time.

WORK PERFORMED

Eradication

Table No. 1 summarizes the results of the NIRA work.

Most of the operations were normal and need nothing by way of explanation. Hazel Green camp, however, as may be inferred from the description of its location, shows a very low acreage per man day. This was entirely due to the exceedingly great number of bushes on the cut-over land, their large size and deeply rooted habits, the rocky ground, and the extreme steepness of the topography.

Checking

The checking of NIRA work was handled similarly to the checking of CCC work. For virgin timber or areas where the Ribes were ecologically on the decline, a standard of 25 feet or three bushes per acre was maintained except where the lateness of the season and the closing of the camps prevented the reworking of an area. This standard was somewhat lowered for cut-over lands due to the growing realization that they should be worked to a different standard since they are a distinctly different eradication problem. Under the conditions on recent cut-over lands Ribes establish themselves in great numbers and are by no means in a state of equilibrium ecologically, so that reeradications are necessary in any case. Therefore, when the live stem will increase many fold in one year's time, there is not the need in the first eradication to reduce it to the same extent as is done in virgin stands.

The aim on cut-over land was to remove by the initial eradication all fruiting bushes or bushes that would produce fruit before the next eradication. Checking on logged areas was therefore directed in this manner with no fixed limit as to amount of remaining live stem. The amount of live stem left on logged areas would occasionally amount to as much as 150 feet per acre, generally distributed over many small bushes.

COSTS

A summary of all NIRA expenditures for California justly chargeable to the field operations is given in Table No. 2 and analyzed by camps in Table No. 3.

TABLE NO. 2

SUMMARY OF THE COST OF RIBES ERADICATION BY NIRA CAMPS
STANISLAUS NATIONAL FOREST, CALIFORNIA
1933

	Item	Cost	Percent of Total
Supervision	Salaries of Supervisors, Foremen, Checkers, etc.	$10,433.79	13.74
	Expenses	1,356.08	1.79
	Field Office Overhead	231.27	0.30
	Sub-total	12,021.14	15.83
Wages	Laborers (Crewmen and Crew Leaders)	40,518.05	53.35
	Sub-total	40,518.05	53.35
Subsistence	Salaries of Cooks and Flunkies	4,055.30	5.34
	Salaries of Truck Drivers	466.33	0.61
	Transportation of Food	102.37	0.14
	Cost of Food	11,281.65	14.85
	Sub-total	15,905.65	20.94
Equipment	Depreciation of Trucks	1,019.78	1.34
	Depreciation of Other Non-expendable Equipment	4,444.37	5.85
	Transportation of Equipment	1,197.54	1.58
	Sub-total	6,661.69	8.87
Miscellaneous	Supplies (Expendable Equipment)	481.44	0.63
	Expenses	51.72	0.07
	Twine	174.73	0.23
	Sub-total	707.89	0.93
Transportation of men	Salaries of Truck Drivers	61.60	0.08
	Gas, Oil, Repair	72.20	0.10
	Sub-total	133.80	0.18
	Total	$75,948.22	100.00

TABLE NO. 3

ANALYSIS OF THE COSTS OF NIRA WORK BY CAMP
STANISLAUS NATIONAL FOREST, CALIFORNIA

Camp Av. No. Laborers Per Work Day	Super-vision	Wages	Subsistence: Wages of Cooks and Flunkies	Subsistence: Food and Transport. of Food	Subsistence: Cost Per Meal	Equipment and Trans. of Equipment	Miscel-laneous	** Trans-port. of Men	Total Cost	Cost Per Man Day	Cost Per Acre
Beaver Creek 45.8	$ 1,502.30	$ 4,949.76	$ 474.60	$ 1,615.22	$0.305	$ 815.32	$ 82.76	$ 43.37	$ 9,483.33	$5.91	$ 3.48
Hayward Creek 23.7	828.69	2,577.53	360.20	964.75	0.352	429.42	41.60	21.72	5,223.91	6.13	4.71
Big Trees 46.4	1,379.92	5,201.96	509.60	1,606.30	0.309	815.33	86.51	43.37	9,642.99	5.54	2.63
Fiddlers Green 22.2	783.58	2,590.15	307.20	917.37	0.350	407.97	42.38	0.00	5,048.65	5.99	3.89
Cow Creek 56.5	1,796.92	6,546.80	668.50	1,595.96	0.266	1,074.03	110.89	0.00	11,793.10	5.64	6.96
Bumblebee 40.6	1,269.84	3,757.00	283.40	994.87	0.281	750.03	84.32	0.00	7,139.46	5.86	2.70
Lily Creek 40.0	1,408.38	4,303.80	461.20	1,128.80	0.285	741.00	82.76	0.00	8,125.94	5.98	3.80
North Crane 43.7	1,586.56	4,950.60	514.60	*1,349.87	0.274	841.68	98.57	25.34	9,367.22	5.87	1.75
Hazel Green 48.5	1,464.95	5,640.45	476.00	1,677.21	0.280	786.91	78.10	0.00	10,123.62	5.72	14.48
Totals or Av. 367.4	$12,021.14	$40,518.05	$4,055.30	$11,850.35	$0.294	$6,661.69	$707.89	$133.80	$75,948.22	$5.81	$ 3.56

*Meal charges of two men on Reconnaissance Project have been deducted.
**Transportation of men to and from work.

In Table No. 4 is shown the proportion of Federal, state and private lands covered during 1933 by CCC and NIRA eradication crews for the different forest areas on which control work was performed. For the work as a whole, 56.9 percent of the areas treated were federally owned. 3.7 percent state, and 39.4 percent private.

TABLE NO. 4

RESULTS OF RIBES ERADICATION WORK ACCORDING TO LAND OWNERSHIP

Area	Results of Work	Ownership Status						
		*Federal	Percent	Private	Percent	**State	Percent	Total
Plumas Forest CCC Work	Acres	4,494.0	75.2	1,485.0	24.8	-	-	5,979.0
	Man Days	6,147.0	75.1	2,033.0	24.9	-	-	8,180.0
	Ribes	300,022	68.4	138,723	31.6	-	-	438,745
Eldorado Forest CCC Work	Acres	808.0	100.0	-	-	-	-	808.0
	Man Days	909.0	100.0	-	-	-	-	909.0
	Ribes	65,806	100.0	-	-	-	-	65,806
Stanislaus Forest CCC Work	Acres	7,989.8	71.8	2,688.4	24.2	454.2	4.0	11,132.4
	Man Days	7,406.0	60.2	4,232.7	34.4	669.0	5.4	12,307.7
	Ribes	801,849	49.9	726,484	45.2	77,192	4.9	1,605,525
Yosemite Park CCC Work	Acres	470.0	100.0	-	-	-	-	470.0
	Man Days	1,285.0	100.0	-	-	-	-	1,285.0
	Ribes	252,138	100.0	-	-	-	-	252,138
Total CCC Work	Acres	13,761.8	74.8	4,173.4	22.7	454.2	2.5	18,389.4
	Man Days	15,747.0	69.4	6,265.7	27.6	669.0	3.0	22,681.7
	Ribes	1,419,815	60.1	865,207	36.6	77,192	3.3	2,362,214
Stanislaus Forest NIRA Work	Acres	*8,835.7	41.4	11,484.2	53.9	1,004.0	4.7	21,323.9
	Man Days	5,999.8	45.9	6,593.9	50.4	477.0	3.7	13,070.7
	Ribes	1,440,935	43.7	1774,062	53.8	83,978	2.5	3,298,975
Grand Totals CCC and NIRA Work	Acres	22,592.5	56.9	15,657.6	39.4	1,458.2	3.7	39,713.3
	Man Days	21,746.8	60.8	12,859.6	36.0	1,146.0	3.2	35,752.4
	Ribes	2,860,750	50.5	2639,269	46.6	161,170	2.9	5,661,189

*The NIRA work done on Federal lands by the Division of Blister Rust Control was financed by Region 5 of the U. S. Forest Service from their IMPNIRA Blister Rust Control allotment.
**Calaveras State Park.

CONTROL RECONNAISSANCE IN CALIFORNIA

By

F. A. Patty

Assistant Pathologist

INTRODUCTION

Control reconnaissance was begun in Yosemite National Park in 1933. In addition, several small areas on the Stanislaus, Eldorado and Plumas National Forests, which had been omitted during the first working of these forests, were included.

DESCRIPTION

Yosemite National Park

Of the 752,640 acres of land within the boundaries of the Park about 100,000 acres are estimated to be sugar pine type. Approximately half of the area lies to the north of the Merced River and the other half to the south. During 1933 the reconnaissance survey was confined to the northern part which lies between the Tuolumne and Merced Rivers. It is bordered on the west by the Stanislaus National Forest and on the east by the higher mountains of the Park. Small branches of the Tuolumne and Merced Rivers and the Middle Fork and South Fork of the Tuolumne form the principal drainages. The Big Oak Flat and Tioga Pass Highways and the Coulterville road make the area fairly accessible. As a whole the country is not steep except along the north, east and west boundaries. Due to the frequent ground fires, before the advent of fire protection, much of the area is covered with brush. Approximately 2,500 acres of sugar pine type have been cut-over and the balance represents an excellent stand of virgin sugar pine.

A detailed description of the three national forests has already been made in the 1927, 1928 and 1930 annual reports.

The areas worked in 1933 on the national forests consisted in general of outlying bodies of sugar pine adjacent to the main sugar pine types previously covered by reconnaissance.

The Hazel Green Unit on the Stanislaus National Forest is west of the Yosemite National Park Unit and lies on both sides of a high ridge. The country is generally steep, and cut up only by small streams. The Big Oak Flat Highway and the Coulterville Road make most of the area accessible. Approximately 2,500 acres have been cut-over and they now support heavy concentrations of Ribes and other brush.

The Lumber Yard Unit on the Eldorado National Forest lies to the east of Bear River and north of the Amador Highway. The timber is generally poor and is interspersed with many large brush patches.

The Canyon Dam Unit near Lake Almanor is on the Plumas National Forest. It is a gentle rolling country consisting mainly of open sugar-pine-ponderosa pine type. There is very little brush and the Ribes do not occur in heavy concentrations.

METHODS OF WORK

The mechanical methods used in collecting data and making the field type maps were the same as those employed in 1932.

The compilation of the field data was also handled in the same way as in the preceding year except that the stream type and stream cut-over type were lumped together as stream type.

Field work was performed by C. W. Fowler and A. G. Applegarth in Yosemite Park. The Park Service paid Fowler's salary and furnished the transportation and the Division of Blister Rust Control paid Applegarth's salary. However, during the last four weeks of the season the Division of Blister Rust Control paid the salaries of both men.

Field work on the national forests was performed by ECW checkers who were assigned to blister rust control work in the CCC camps. T. H. Harris supervised the work on the Plumas, D. R. Miller on the Eldorado, and F. A. Patty on the Stanislaus National Forest.

WORK PERFORMED AND RESULTS OBTAINED

The results of the reconnaissance survey for 1933 are given in the following tables:

TABLE NO. 1

LOCATION OF RECONNAISSANCE BY TOWNSHIP, RANGE, AND SECTION, CALIFORNIA, 1933

T*	R	Sections by Number	No.	Acres
1S	19E	31	1	896
1S	20E	4-11, 14-23,26-30,32-34	26	17,538
2S	19E	1-13, 15-18, 22-25	21	13,440
2S	20E	3-11, 14-23, 26-35	29	18,160
3S	20E	5	1	320
1N	20E	26-27,33-34	4	2,560
8N	15E	2, 4, 9-11	5	2,880
8N	16E	20-21, 27-29	5	2,880
27N	8E	11-14, 22-27	10	5,705
Totals			102	64,379

*Mt. Diablo Meridian

TABLE NO. 2

RIBES ANALYSIS OF AREAS COVERED BY RECONNAISSANCE
IN CALIFORNIA - 1933

Part A - Crane Flat			Yosemite National Park				
	Acre		Ribes Per Acre				
Types	Number	Percent of Total	R.roezli	R.nevadense	R.visco.	R.cereum	Species Totals
SP-PP	13,209	35.1	17.2	0.9	0.8	0.5	19.4
SP-PP-CO	1,164	3.1	143.9	9.7			153.6
SP-Fir	11,536	30.6	67.5	5.8	8.8	0.8	82.9
SP-Fir-CO	1,244	3.3	302.2	28.9	0.4	0.5	332.0
NON-SP	7,944	21.1	24.6	0.6	14.6	5.4	45.2
NON-SP-CO	60	0.2	33.0	3.0			36.0
Brush	1,040	2.8	61.3	1.4	0.4		63.1
Stream	1,421	3.8	83.6	158.5	3.7	0.5	246.3
Totals or Averages	37,618	100.0	51.3	9.5	6.2	1.6	68.6

Part B - Hazel Green			Stanislaus National Forest				
	Acre		Ribes Per Acre				
Types	Number	Percent of Total	R.roezli	R.nevadense	R.visco.	R.cereum	Species Totals
SP-PP	5,695	37.2	32.0	0.5			32.7
SP-PP-CO	1,951	12.7	180.0	2.6			182.5
SP-Fir	3,435	22.5	90.8	1.2			92.1
SP-Fir-CO	1,300	8.5	411.1	15.0			426.2
NON-SP	2,337	15.3	11.4	0.8			12.2
NON-SP-CO	60	0.4					
Brush	25	0.2					
Stream	493	3.2	110.6	111.7			222.4
Totals or Averages	15,296	100.00	95.6	5.8			101.4

Part C - Canyon Dam			Plumas National Forest				
	Acre		Ribes Per Acre				
Types	Number	Percent of Total	R.roezli	R. nevadense	R.visco.	R.cereum	Species Total
SP-PP	4,538	79.5	10.7	0.3			11.0
SP-PP-CO	882	15.5	100.2	4.5			104.8
SP-Fir	50	0.9	25.0	15.0			40.0
Stream	235	4.1	70.7	45.6			116.5
Totals or Averages	5,705	100.0	27.1	3.0			30.1

TABLE NO. 2 (Con'd)

RIBES ANALYSIS OF AREAS COVERED BY RECONNAISSANCE IN CALIFORNIA - 1933

Part D - Lumber Yard			Eldorado National Forest				
	Acre		Ribes Per Acre				
Types	Number	Percent of Total	R.roezli	R.nevadense	R.visco.	R.cereum	Species Totals
SP-PP	1,208	21.0	4.4	1.1			5.4
SP-Fir	2,195	38.1	78.4	3.5	12.2		94.1
NON-SP	2,114	36.7	90.9	1.4	0.3	10.7	103.3
Brush	75	1.3	7.0				7.0
Stream	168	2.9	80.7	7.8	1.9	1.1	91.5
Totals or Averages	5,760	100.00	74.9	2.3	4.8	4.0	85.9

Part E - Summary of All Areas							
	Acre		Ribes Per Acre				
Types	Number	Percent of Total	R.roezli	R.nevadense	R.visco.	R.cereum	Species Totals
SP-PP	24,650	38.3	20.8	0.7	0.4	0.3	22.2
SP-PP-CO	3,997	6.2	151.9	5.1			156.9
SP-Fir	17,216	26.7	73.4	4.6	7.4	0.6	86.1
SP-Fir-Co	2,544	4.0	357.9	21.8	0.2	0.2	380.1
NON-SP	12,395	19.3	33.5	0.8	9.4	5.3	48.9
NON-SP-CO	120	0.2	16.5	1.5			18.0
Brush	1,140	1.7	56.4	1.3	0.8		58.5
Stream	2,317	3.6	87.8	126.2	2.4	0.4	129.0
Totals or Averages	64,379	100.00	61.8	6.2	4.1	1.3	73.3

STATEMENT OF COSTS

The cost per acre of reconnaissance for Yosemite National Park amounted to $.029. This included the salaries of Applegarth and Fowler, a prorated amount for supervision and the cost of transportation. The cost of the work on the national forests was not figured because it was performed at irregular periods by ECW blister rust checkers.

PREERADICATION

By
W. V. Benedict
Assistant Forester

For the purpose of outlining working units, locating camp sites, and studying eradication conditions in preparation for the work proposed for 1934, a preeradication survey was made of the Plumas, Eldorado and Stanislaus National Forests. The permanent personnel were engaged in this during parts of late October and early November. Examinations were carried on by car and afoot; on the Stanislaus the crew packed into the Middle Fork country for a week's work.

Projects were outlined to accomodate approximately 2,000 men for the state. Because of the limited time available the methods used were cursory, and thus limited the degree of detail secured.

Table No. 1 is a summary of the preliminary Ribes eradication surveys made in 1933.

TABLE NO. 1

RESULTS OF PREERADICATION

National Forest	Working Unit	Acres in Unit SP Type	Non-SP Type	Total	Percentage in Govt. Ownership	Acres Per Man Day	* Workers Needed
Plumas	Quincy	33,883	-	33,883	79	1.75	230
	Greenville	39,063	-	39,063	50	1.65	290
	Totals	72,946	-	72,946	63	1.70	520
Eldorado	Cat Creek	9,700	1,500	11,200	82	2.19	64
	S. Fork American River	31,341	5,701	37,042	75	2.15	215
	Silver Creek Drainage	52,790	3,760	56,550	25	2.06	343
	Goggins Mine	5,120	1,760	6,880	46	2.00	43
	Totals	98,951	12,721	111,672	48	2.10	665
Stanislaus	S. & Middle Forks Mokelumne River	34,340	13,020	47,360	32	2.30	240
	Beaver, Skull, Griswold and Soap Creeks	38,000	5,520	43,520	30	2.30	236
	Middle Fork of Stanislaus	9,600	960	10,560	86	3.00	45
	Wrights, Lily and Hull Creeks	9,500	2,340	11,840	58	1.80	75
	Jawbone and Woods Ridge	13,680	2,000	15,680	38	3.10	63
	Carl Inn Hazel Green	18,780	7,800	26,580	31	2.80	120
	Totals	123,900	31,640	155,540	37	2.50	779
Grand Totals		295,797	44,361	340,158	-	-	1,964

*Based on 80 work days.

PROGRESS REPORT OF THE SUGAR PINE SURVEY OF CALIFORNIA

By
W. V. Benedict
Assistant Forester

The statement on the status of the Sugar Pine Survey of California given in the annual report for 1932 carries the progress of the survey down to January 30, 1933. Since that time work has been continued upon it, but the interruptions have been so many due to NIRA and CCC activities that the survey is still unfinished and hence necessitates that the present statement be in the nature of a progress report. The work is handled down to February 28, 1934.

Recapitulating briefly, the objects of the survey are to show:

1. The location of all sugar pine type in California on National Forest base maps.

2. The total volume and acreage of sugar pine in the sugar pine types by class of ownership.

3. An estimate of sugar pine volume outside the sugar pine type.

4. Recommendations as to the acreage and stand of sugar pine to be protected, by classes of ownership and priority of treatment.

5. An estimate of the cost of control for areas selected for treatment.

To date, then, the following is the progress made in the Survey:

Type maps are completed for all the National Forests in central and northern California having commercial quantities of sugar pine, namely the Stanislaus, Eldorado, Sierra, Plumas, Lassen, Tahoe, Shasta, Sequoia, Klamath, Trinity and Mendocino National Forests. Only those forests have been excluded from the survey where sugar pine is present in the botanical sense alone.

For the first five of these forest summary tables have been prepared which show by township and working circle the ownership of sugar pine type expressed in acres and thousands of board feet, and an estimate of the volume of sugar pine outside the sugar pine type. Table No. 1 is an epitome of these summaries. Table No. 2 gives the acreages of sugar pine type taken from the type maps for the remaining forests.

There still remain to be made acreage and volume tables for the six less important sugar pine forests, recommendations as to the acreage and stand of pine to be protected, and estimates of the cost of control for these areas.

TABLE NO. 1

SUMMARY OF ACREAGES AND VOLUMES* OF SUGAR PINE FOR FIVE OF THE MOST IMPORTANT SUGAR PINE FORESTS OF CALIFORNIA

National Forest	Sugar Pine Type						Non Sugar Pine Type***				Total Sugar Pine Volume
	Virgin Timber				Acreage Sugar Pine Cut-over	Total Acreage Sugar Pine Type	Virgin Timber				
	Acres	Volume	Av. Vol Per Acre	Percent Acreage Cruised			Acres	Volume	Av. Vol. Acre	Percent Acreage Cruised	
Lassen	309,404	2,472,182	7,990	94.5	**77,167	386,571	259,330	300,591	1,159	95.6	2,772,773
Plumas	325,011	2,776,552	8,543	86.1	55,993	381,004	251,371	245,289	0.975	78.2	3,021,841
Eldorado	185,452	1,872,017	10,094	74.5	25,063	210,515	214,204	221,968	1.036	51.0	2,093,985
Stanisluas	191,172	2,417,701	12,647	86.0	71,625	262,797	114,756	115,881	1.010	92.5	2,533,582
Sierra	106,569	995,243	9,339	89.2	72,147	178,716	95,873	105,708	1.102	78.8	1,100,951
Totals or Averages	1,117,608	10,533,695	9,425	86.8	301,995	1,419,603	935,534	989,437	1.058	78.6	11,523,132

*All Volumes are in MBM.

**This acreage has a volume of 42,829 MBM (Av. Vol. per acre of 0.555 MBM).

***Contains Sugar Pine but less than 3 MBM per acre.

TABLE NO. 2

ACREAGE OF SUGAR PINE TYPE ON THE NATIONAL FORESTS OF CALIFORNIA

National Forest or Park		Acreage of Sugar Pine Type
National Forest	Mendocino	66,280
	Trinity	340,200
	Klamath	279,370
	Shasta	431,900
	Tahoe	76,210
	Sequoia	**156,522*
	National Forests Listed in Table No. 1	1,419,603
	Sub-Total	2,770,085
National Park	Yosemite	260,869*
	General Grant	2,226*
	Sequoia	86,957*
	Sub-Total	350,052
	Grand Total	3,120,137

* Figures are best estimates available.
** Represents one-third of old mixed conifer type.

SCOUTING FOR BLISTER RUST IN CALIFORNIA-1933

By
Leiton E. Nelson
Agent

INTRODUCTION

During the first ten years after the introduction of blister rust in the west of Vancouver, B. C. in 1910, the disease spread as far south in the Cascade Mountains as Mt. Jefferson in Oregon, which is an air line distance of approximately 325 miles. During the next ten year period (1921-1930), the rate of southward movement was greatly reduced as is evidenced by the fact that scouting south of Mt. Jefferson in Oregon, and in California, has disclosed only one pine infection center which was found in 1933 near Bohemia, Oregon.

There appears to be no good reason for an abrupt cessation of southward spread since there is no apparent barrier to the movement or development of rust in the southern Oregon and northern California regions. The prevailing wind direction there is not radically different from that in the region north of Mt. Jefferson. The aridity of parts of this region should not inhibit rust spread, since there are other parts, extensive in area, that receive sufficient moisture for fungous growth. And last, but not least, excellent associations of white pines and Ribes growing in moist sites are not at all uncommon in this region.

Because, therefore, of the reasonableness of the theory that the rust was spreading south of Mt. Jefferson, and would eventually reach northern California, this region has been scouted for blister rust each year since 1929. This work has been extensive in nature up to 1933 when the establishment of the NIRA project, in August, made it possible to start an intensive scouting program.

Six men from the Spokane office, with trucks and equipment, were assigned to this work for the months of September and October. In addition, the California state leader spent parts of August and November scouting in this part of the state.

PURPOSE

Assuming that the rust has spread into California, the purpose of scouting is to locate the disease.

LOCATION OF WORK

Scouting was carried on in four general regions in northern California, namely: coastal, intermountain, east-central and northeastern. The coastal region comprises an area from the state line south as far as Eureka, and east from the coast to the summit of the Coast range. The intermountain region, which is mainly an area drained by the Klamath River and its tributaries, extends from the state line south to the Trinity River, and from the Coast range east to the Pacific Highway. The east-central region includes portions of the area east of the Pacific Highway and from the state line south to Red Bluff. The northeastern region includes the portion of the Warner Mountains that is in California.

ORGANIZATION AND METHODS

The six-man party was organized into three two-man crews, each equipped with a truck and a suitable camping outfit. Crew No. 1 worked the coastal and northeastern units; crew No. 2 the intermountain region; and crew No. 3 the east-central unit, except for the last two weeks of the season which were spent in the coastal section near Eureka.

The method employed included the examination of Ribes and pines along the streams of all drainages within each unit. As much of each stream area was worked as it was reasonably possible to reach. Special emphasis was placed on scouting in the upper parts of these areas where the travel time required to reach these parts was not excessive.

Since infected Ribes are indicators of both long and short distance spread, most of the scouting was confined to this host. It was the practice to examine pines where they were readily accessible.

RESULTS

No blister rust was found in northern California. By this statement it is not to be inferred that there is no blister rust in that part of the state, for in two months time it was possible to cover only a small part of the total area. A large amount of scouting in the future is necessary before this region will have been adequately covered.

Much information was obtained which will be of value to those doing scouting in this region in the future. This has reference to the classification of areas according to their importance for intensive or extensive work, or elimination from future programs.

The intermountain region presents the best area for intensive scouting. In this area is included the coast mountains where the upper Smith River drainage offers fair association of susceptible pines and Ribes. Such tributaries of the Klamath River as Indian Creek, Beaver Creek and Horse Creek offer excellent associations of pines and Ribes. The higher mountain ranges, including the Marble Mountains and Salmon-Trinity Alps primitive areas and the Warner Mountains, are very favorable because of the close association of western white pine and sugar pine with Ribes. Excellent scouting was found on areas in the vicinities of Weed, Mt. Shasta City, Forest Glen and Mt. Lassen.

The following table shows the number of pines and Ribes examined:

TABLE NO. 1

NUMBER OF RIBES AND PINES, BY SPECIES, EXAMINED FOR BLISTER RUST
NORTHERN CALIFORNIA, 1933

Host Species	Number of Host Plants Examined in Each Region				
	Coastal	Inter-mountain	East central	Warner Mts.	All Regions
Ribes					
R. bracteosum	9,944	2,160	732		12,836
R. klamathense	25	5,480	1,842		7,347
R. cruentum	218	4,964	97		5,279
R. viscosissimum		4,565	10	500	5,075
R. binominatum		4,000			4,000
R. lacustre	40	1,797	120		1,957
R. lobbii		1,231			1,231
R. sanguineum	446	499	95		1,040
R. roezli	108	20	780		908
R. nevadense		330	390		720
R. inerme		555		26	581
R. divaricatum	503				503
R. hallii		292			292
R. cereum		5	1	120	126
R. aureum		111			111
R. laxiflorum	101				101
R. velutinum		95		1	96
R. glutinosum	76				76
R. nenziesii	58				58
R. montigenum			1	50	51
R. vulgare			6		6
R. petiolare				1	1
All Ribes	11,519	26,104	4,074	698	42,395
Pines					
P. lambertiana	35	2,284	312		2,631
P. monticola	115	975		125	1,215
P. albicaulis		90		25	115
All Pines	150	3,349	312	150	3,961

This table includes the hosts examined by the state leader.

COSTS

The following is a summary of costs for scouting in California. This includes charges against both the regular and NIRA appropriations.

TABLE NO. 2

ANALYSIS OF COSTS
NIRA AND REGULAR APPROPRIATIONS
SCOUTING IN CALIFORNIA
1933

Items	Regular Appropriation Project 4.15	NIRA Appropriation Project 7.15	Both
Salaries	$3,781.45	$2,199.34	$5,980.79
Subsistence	176.42	946.14	1,122.56
Transportation:			
Government owned trucks	30.33	1,293.22*	1,323.55
Personally owned cars	125.45	37.06	162.51
Pack stock		15.75	15.75
Other	46.52	6.45	52.97
Miscellaneous	38.30	42.39	80.69
Total	$4,198.47	$4,540.35	$8,738.82

* Includes $1,102.68 cost of two trucks. Depreciation of these during California scouting was computed as $258.56.

PROGRESS OF INVESTIGATIVE WORK IN THE CHEMICAL ERADICATION OF RIBES SEPTEMBER 1932 TO SEPTEMBER 1933

By

H. R. Offord, Agent; G. R. Van Atta, Agent; R. P. d'Urbal, Assistant Chemist; and C. R. Quick, Jr. Microanalyst

INTRODUCTION

Laboratory and field investigations in the chemical eradication of Ribes have been in progress during the period September 1932 to September 1933. The laboratory studies were conducted at the University of California, Berkeley, California. The field studies in the Stanislaus National Forest, California; at Swauk Creek, Wenatchee National Forest, Washington; and St. Maries River, Clarkia, Idaho. The results of laboratory and greenhouse experiments of this period will be briefly summarized, since detailed separate reports covering the work are already on file. The field work will be reported in full.

The objectives of the 1933 field season were as follows:

1. Checking of the 1932 experimental plots at Swauk Creek, Wenatchee National Forest, Washington.

2. Continuation of studies of the gross morphology of Ribes stem and root systems.

3. Continuation of ammonium thiocyanate dosage studies on Ribes inerme and R. petiolare for one or more typical sites in north Idaho.

4. Determination of the effectiveness of topping R. viscosissimum, R. roezli, and R. cereum and applying powdered sodium fluoride or copper sulphate, crystals of ammonium thiocyanate, or Diesel oil to the mutilated crowns.

5. Determination of the lethal dosage of sodium chlorate, ammonium thiocyanate, zinc ammonium chloride, and Diesel oil on R. roezli when applied as a combined spray and soil drench.

6. Determination of the relative toxicity of pure sodium chlorate and of sodium chlorate plus sodium bicarbonate when applied as combined sprays and drenches on R. roezli and R. petiolare.

7. Investigation of the spontaneous combustion of chlorates in mixture with such materials as wood flour or dry, powdered forest litter.

8. Recheck of 1930 R. erythrocarpum plots at Crater Lake National Park, Oregon.

This work will be discussed herein under the following alphabetical divisions: A. Results of 1932 field work. B. Laboratory and greenhouse investigations September 1932 to June 1933. C. Chemical field experiments of 1933. D. Progress of studies in the gross morphology of Ribes stem and root systems. E. Recommendations for the use of chemicals in Ribes eradication. F. Proposed laboratory and greenhouse work September 1933 et sequitur.

A. RESULTS OF 1932 FIELD WORK.

The plot studies undertaken last year in the Wenatchee National Forest were designed to achieve the four major purposes stated as follows on pages 269 and 270 of the 1932 annual report:

1. The comparison and evaluation of sodium chlorate and ammonium thiocyanate as herbicides upon R. inerme.

2. The determination of the relative effectiveness of three methods for applying the two chemicals, named above, to R. inerme. The three methods to be tested were: (a) application of chemical as an aqueous spray to aerial plant parts; (b) application of chemical in solution beneath the surface of the gound to the soil about the roots of the plants; (c) application of chemical by a combination of the two foregoing methods.

3. The establishment of the minimum dosage of either sodium chlorate or ammonium thiocyanate necessary to accomplish the eradication of R. inerme.

4. An inquiry designed to discover the main causes underlying the observed fact that Ribes plants of the same species growing upon different sites sometimes respond quite differently to identical treatments.

The account of the progress of the experiments with reference to the foregoing objectives will be preceded by a description of the new methods employed this year for gathering checking data. Results of the minor studies will be reviewed at the end of this section of the report.

Checking

Two checks were made this year on the experimental plots. The first check was performed during the first three weeks of May; the second was made on the 23rd, 24th and 25th of August. The methods employed in gathering the field data differed in a number of particulars from the procedure formerly used. The spring check was performed as follows: the boundaries of each plot were first marked with string line, after which strings spaced 6.6 feet apart were laid across the width of the plot. The strips thus formed were then subdivided into sections each 6.6 feet square. The data relating to each of these milacre sections were gathered and recorded separately. The sections were numbered, the system of numeration being similar to that used in land survey. The data for each section are comprised in the following list:

1. Feet of live and feet of dead Ribes stem.

2. Number of live and number of dead Ribes plants.

3. Number of Ribes crowns sprouting.

4. Approximate maximum height of Ribes plants.

5. Presence and description, or absnece of brush other than Ribes. If such brush was present, the effect of the chemical treatment upon it was recorded.

6. Presence and description of all obstructions such as snags, logs, trees, etc.

7. Presence of running or standing surface water.

8. Depth of soil above water table surface at the time of the check.

Ribes data were recorded separately for each species encountered. Great care was exercised to accurately count the number of plants and feet of Ribes stem. Physical measurement replaced ocular estimates to a far greater degree than in the practice of recent years. Whenever gross external evidence failed to definitely distinguish between live and dead material, the plants concerned were partially, or sometimes completely dissected. These attempts to achieve so much precision in the spring check could be justifiably made only upon experimental plots that had been subject to equal care in their establishment. It will be recalled that elaborate precautions were taken in 1932 to plan and perform the Washington plot experiments in such a manner that a high degree of accuracy of treatment would be attained.

As a part of the work of checking, a series of overlay maps of the experimental area was prepared. These maps constitute a permanent graphic record of the conditions prevailing on the plots at the time of the May check. They will be used in a projected study of the permanence of Ribes suppression on the experimental area.

The principal features of the May check are presented in numerical form in Tables Nos. 1 to 8.

A number of photographs showing conditions on the plots before and after treatment were taken in 1932 and 1933. Some of these pictures are reproduced in the following pages. The August check concerned the nine plots that had received spray applications only. Three of these had been treated with ammonium thiocyanate and the remaining six with sodium chlorate. Only _R. inerme_ data were taken. Counts were made of the number of live root centers, number of 1933 seedlings, feet of old live stem, and feet of current season stem.

Table No. 8 partially summarizes the August check and presents a gross comparison of the spring and fall checks.

Comparison of Effectiveness of Methods

Study of the tabular data with regard to progress toward the main objectives of the program can be most easily begun by considering the relative effectiveness of the methods of application. Facts bearing upon this subject are to be found in each of the first seven tables. The essential data are, however, presented more concisely in Table No. 2 than elsewhere. The high proportion of dead _R. inerme_ stem found on all the plots makes stem kill percentages a poor basis for comparison. In the following discussion, unless otherwise specifically stated, remakrs concerning effectiveness of treatment refer to the precentages of plants dead at the time of checking rather than percentages of dead stem.

TABLE NO. 1

GROSS RESULTS OF FIELD EXPERIMENTS PERFORMED IN WASHINGTON DURING 1932

Plot No.	Chemical Used	Method of Application	Pounds Chemical Per Gallon Soln.	Pounds Chemical Per Acre	Plants Treated	Plants Treated Per Acre	Feet Stem Treated	Feet Stem Per Acre	Per Cent Plants Dead	Per Cent Stem Dead
			Ribes inerme							
10	Ammonium thiocyanate	Subsurface Drench	0.50	2,500	169	4,408	4,493	119,828	35	58
11	do	do	0.50	3,500	126	3,360	6,674	175,389	60	89
12	do	do	0.50	5,000	74	1,974	6,950	184,356	46	78
13	do do	Subsurface Drench Spray	0.50 1.43	1,500 1,000	49	1,307	3,425	91,078	45	86
16	do do	Subsurface Drench Spray	0.50 1.43	2,500 1,000	97	2,587	15,597	415,972	69	95
14	do do	Subsurface Drench Spray	0.50 2.14	3,500 1,500	89	2,373	10,851	289,396	89	99
21	do	Spray	2.50	2,500	84	2,485	17,033	503,856	68	98
20	do	do	1.75	3,500	70	1,982	19,030	538,930	91	100
19	do	do	2.50	5,000	61	1,627	8,049	214,666	95	100
33	Calcium Chloron Sodium hydroxide	Foliage & Surface Drench	0.50 0.01+	5,000 133	Plot entirely under running water at time of check. Plants undamaged by beavers, growing vigorously. Formal check impossible.					
35	Calcium Chloron Sodium hydroxide	do	1.00 0.02+	5,000 266	50		4,935		0	6
31	Sodium arsenite	Subsurface Drench	0.50	3,500	61	3,228	7,731	409,047	100	100
18	do	do	0.50	5,000	43	2,324	9,927	536,554	100	100
17	do	do	0.50	6,011	133	3,547	10,545	281,235	99	100
1	Sodium chlorate	do	0.50	2,500	67	1,982	4,106	121,479	34	61
4	do	do	0.50	3,500	93	2,818	12,859	389,628	22	69
2	do	do	0.50	5,000	97	2,705	4,009	112,214	58	82
26	do	do	0.32+	14,000	52	1,844	16,147	927,373	10	71
3	do do	Subsurface Drench Spray	0.50 1.43	1,500 1,000	59	1,896	3,580	114,454	73	86
6	do do	Subsurface Drench Spray	0.50 1.43	2,500 1,000	69	2,040	7,697	227,677	57	87
5	do do	Subsurface Drench Spray	0.50 2.14	3,500 1,500	48	1,437	3,196	85,688	58	91
7	do	Spray	2.50	2,500	42	1,273	2,996	90,779	55	70
28	do	do	2.50	2,500	68	1,814	17,649	470,672	50	93
29	do	do	1.75	3,500	71	1,894	7,610	202,959	96	99
8	do	do	2.65	4,000	80	2,648	5,456	183,248	83	97
9	do	do	2.50	5,000	70	1,867	8,176	218,054	83	99
27	do	do	2.50	5,000	50	1,333	9,090	242,430	76	98
32	do	Foliage & Surface Drench	0.50	5,000	115	4,546	7,333	289,873	30	71
34	do	do	0.50	5,000	Condition of plot same as 33. Heavy damage by chemical apparent. Formal check impossible.					
			Ribes petiolare							
11	Ammonium thiocyanate	Subsurface Drench	0.50	3,500	20		389		80	95
12	do	do	0.50	5,000	18		676		95	98
13	do do	Subsurface Drench Spray	0.50 1.43	1,500 1,000	1		5		100	100
19	do	Spray	2.50	5,000	3		110		100	100
35	Calcium Chloron Sodium hydroxide	Foliage & Surface Drench	1.00 0.02+	5,000 266	2		825		0	32
3	Sodium chlorate dc	Subsurface Drench Spray	0.50 1.43	1,500 1,000	18		375		100	100
7	do	Spray	2.50	2,500	16		343		100	100
9	do	do	2.50	5,000	6		225		100	100

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TABLE NO. 2

COMPARISON OF EFFECTIVENESS OF METHODS FOR APPLYING AMMONIUM THIOCYANATE AND SODIUM CHLORATE TO R. INERME

Pounds of Chemical Applied Per Acre	Subsurface Drench		Combination Subsurface Drench and Spray		Spray	
	Percent Plants Dead	Percent Stem Dead	Percent Plants Dead	Percent Stem Dead	Percent Plants Dead	Percent Stem Dead
Ammonium thiocyanate						
2,500	35	58	45	86	68	98
3,500	60	89	69	95	91	100
5,000	46	78	89	99	95	100
Sodium Chlorate						
2,500	34	61	73	86	(1)52	(1)90
3,500	22	69	57	87	96	99
4,000					83	97
5,000	58	82	58 (2)30	91 (2) 71	(1)80	(1)99
14,000	10	71				

(1) Figure derived by combining data from two plots.
(2) These data refer to plants treated with solution applied in a solid stream as a ground surface and foliage drench.

Table No. 2 clearly shows that the spray treatments were more effective than the corresponding applications made by the other methods. It is evident, therefore, that of the treatments reported here, application of chemical as sprays are the most generally satisfactory. This does not mean, however, that chemical should not be applied to the soil, nor does it mean that subsurface soil treatments are incapable of as high efficiency as spray treatments. Support for the last two statements will serve to introduce the next topic.

Causes for Variation of Treatment Effectiveness

On pages 275 and 276 of the annual report for 1932, attention was directed to the weather conditions that prevailed at the experimental area during the period of treatment application. Rains that fell at critical times converted the intended spray treatments into what amounted to combinations of sprays and soil surface drenches. The rain water, which by the time it reached the ground was chemical laden from contact with the sprayed foliage, only penetrated the soil to a depth of a few inches and there was practically no run-off. The net result of the rainfall was that nearly all the chemical was moved from the foliage to the surface layer of soil. Occasional rains during the field season are the rule rather than the exception throughout the white pine regions of the Inland Empire, and it now appears that they are responsible in a considerable degree for the success of aerial spraying as a method for eradicating Ribes with chemicals. Partial substantiation for this belief can be obtained by examining certain features of the 1932 experiments as set forth in the following paragraphs.

With one important exception, the application of the chemical in the subsurface drench treatments was made uniformly throughout the top 20 inches of soil. This type of treatment was adopted after a few preliminary excavations made near the experimental area had seemed to indicate that the vertical distribution of R. inerme roots was fairly uniform to a depth of from two to three feet. The error of this assumption was not learned until after the treatments were completed. Gross morphological studies conducted this year on the experimental area showed that approximately 66 percent of all the R. inerme roots was confined to the top three inches of soil. A typical R. inerme root system illustrating this point is shown in photographs Nos. 1268 and 1270. If it is assumed that very little vertical chemical movement takes place in the treated soil, it is evident that uniform treatment 20 inches deeper results in the application to the top six inches of soil of only 30 percent of the total chemical used, or stated differently, only 30 percent of the chemical will contact 75 percent of the roots. Justification for assuming very little movement of chemical in treated soil may be found by reviewing the treatment of plot No. 26, and the facts brought out by an examination made this year of the plants occurring on it. Sodium chlorate was applied to the plot as a subsurface drench at the rate of 14,000 pounds per acre. One gallon of solution containing 0.32 pounds of chemical was applied per square foot of plot area. Practical difficulties made it impossible to evenly distribute the solution throughout the top 20 inches of soil. Approximately one-eighth of the chemical was applied evenly to the first 18 inches of soil, while the remaining seven-eighths was delivered at a depth of from 18 to 22 inches. Notwithstanding the relatively huge quantity of sodium chlorate applied to this plot, the spring check revealed fewer plants killed than on any of the other sodium chlorate plots all of which received much less chemical. Observation of excavated plants made on the plot showed that there was practically no root damage by chemical closer to the surface than 10 inches. Below that depth, the roots were blackened and dead. The soil horizon dividing the living from the dead roots was quite definite and surprisingly sharp. These facts mean that the 970 pounds of sodium chlorate distributed per acre in the first 10 inches of soil were not sufficient to seriously damage the roots therein contained. The remainder of the chemical, roughly 13,000 pounds per acre, killed only the 15 to 20 percent of the root tissue that penetrated to a greater depth than 10 inches, but it did not approach closer to the surface either through the soil or through the roots. Thus the limit of upward movement in the soil of the great bulk of sodium chlorate here used cannot have been at the most greater than about 12 inches. Because of the non-mobility of chlorate within the plant body, it is necessary to regard the immediate withering and blasting effect of an aerial chlorate spray applied to R. inerme foliage as being comparable to a severe pruning. If a chlorate could be applied only to the foliage, and stem more than a few inches above the crowns of the plants, and be entirely prevented from reaching the soil surface, crown, roots or buried stem by any path external to the plant, it seems likely that only the very weak plants would die as a result of the treatment. It is believed that dead leaves and other litter which frequently occur under Ribes plants sometimes prevent chemical applied to the foliage from reaching the soil, and thus render the treatments less effective in some localities than in others. Had all the subsurface drench treatments been applied only to the upper six inches of soil, it seems certain that their effectiveness would have been enhanced. Just how much increase in efficiency would have resulted from such a procedure is, of course, a matter for conjecture. It is conceivable, however, that the effectiveness of shallow subsurface soil treatments might equal, or even surpass that of aerial sprays, especially when a contact poison such as chlorate is used.

In Tables Nos. 3 to 6, data taken in the spring check are segregated according to the location and size of the R. inerme plants treated with ammonium thiocyanate and sodium chlorate. These tabulations, although already somewhat condensed, are too extensive to readily yield a clear concept of the influence of each of the major variables under consideration. The inclusion of these tables in this report is partly for the purpose of showing the degree of variability encountered, but principally to indicate the bases used in making the comparisons emobdied in Table No. 7. They also bring out again the difficulty frequently experienced in attempts to correlate the percentage of plants killed with the percentage of stem killed by chemical treatment.

Table No. 7 summarizes briefly most of what has been learned regarding the relation of site and R. inerme plant size to the effectiveness of chemical treatment. In computing the values reported there it was necessary to exclude from consideration certain of the field data in order that each set of figures would be strictly comparable within themselves. Thus, if for example, no plant bearing more than 200 feet of stem was to be found upon a plot, the data taken from that plot were barred from the calculations relating size of plant to effectiveness of treatment. Fortunately it was necessary to discard data from only a few plots for this or similar reasons. Three types of treatment, namely, subsurface drench, spray, and combination of subsurface drench and spray each contribute equal weight to the values recorded. Each chemical dosage concerned also contributes an equal weight to the figures in any one set. Data taken from plots No. 26 and 32 are excluded since they represent special types of treatment. The percentages are to be regarded as relative rather than absolute values; furthermore, it is not possible to directly compare any one figure with every other figure given in the table.

TABLE NO. 3

COMPARISON OF EFFECTIVENESS OF AMMONIUM THIOCYANATE AND SODIUM CHLORATE TREATMENTS APPLIED TO R. INERME GROWING IN THE CENTERS OF PLOTS WITH EFFECTIVENESS OF THE SAME TREATMENTS APPLIED TO PLANTS GROWING ON PLOT AND STREAM MARGINS

Plot Number	Drench (Pounds Chemical Per Acre)	Spray (Pounds Chemical Per Acre)	Exclusive of Plot and Stream Margin		Plot and Stream Margin	
			Percent Dead Plants	Percent Dead Stem	Percent Dead Plants	Percent Dead Stem
			Ammonium Thiocyanate			
10	2,500		43	71	28	47
11	3,500		59	99	60	79
12	5,000		45	80	46	74
13	1,500	1,000	35	89	52	83
16	2,500	1,000	73	88	65	93
14	3,500	1,500	85	99	92	100
21		2,500	73	99	65	97
20		3,500	97	100	85	100
19		5,000	100	100	93	100
			Sodium Chlorate			
1	2,500		39	62	29	59
4	3,500		20	73	23	67
2	5,000		62	86	54	74
26	14,000		16	72	6	71
3	1,500	1,000	90	100	64	66
6	2,500	1,000	79	97	42	84
5	3,500	1,500	70	90	48	92
7		2,500	60	66	42	74
28		2,500	40	95	54	92
29		3,500	84	99	97	97
8		4,000	96	99	77	96
9		5,000	89	99	81	99
27		5,000	81	99	71	98
32	5,000		53	71	34	71
34	5,000		Formal check not performed.			

TABLE NO. 4

COMPARISON OF EFFECTIVENESS OF AMMONIUM THIOCYANATE AND SODIUM CHLORATE TREATMENTS APPLIED TO R. INERME GROWING ON WET SITES WITH EFFECTIVENESS OF SAME TREATMENTS APPLIED TO PLANTS GROWING ON WELL DRAINED SITES

Plot Number	Drench (Pounds Chemical Per Acre)	Spray (Pounds Chemical Per Acre)	Stream Margins and Depth of Soil Above Water Table Less Than One Foot: Percent Dead Plants	Stream Margins and Depth of Soil Above Water Table Less Than One Foot: Percent Dead Stem	Depth of Soil Above Water Table More Than One Foot: Percent Dead Plants	Depth of Soil Above Water Table More Than One Foot: Percent Dead Stem
			Ammonium thiocyanate			
10	2,500		0	19	45	68
11	3,500		45	66	68	93
12	5,000		49	83	39	64
13	1,500	1,000	35	88	52	86
16	2,500	1,000	59	96	74	95
14	3,500	1,500	78	98	95	100
21		2,500	79	99	66	98
20		3,500	Depth of soil above water table more than one foot over entire plot.		91	100
19		5,000	96	100	94	100
			Sodium chlorate			
1	2,500		40	65	30	45
4	3,500		40	90	20	67
2	5,000		58	82	Depth of soil above water table less than one foot over entire plot.	
26	14,000		11	79	9	70
3	1,500	1,000	72	79	74	89
6	2,500	1,000	33	64	61	94
5	3,500	1,500	61	89	56	94
7		2,500	70	77	50	68
28		2,500	22	92	54	94
29		3,500	Depth of soil above water table more than one foot over entire plot.		96	99
8		4,000	46	84	90	99
9		5,000	74	98	89	100
27		5,000	Depth of soil above water table more than one foot over entire plot.		76	98
32	5,000		30	71	Depth of soil above water table less than one foot over entire plot.	
34	5,000		Formal check not performed.			

TABLE NO. 5

COMPARISON OF EFFECTIVENESS OF AMMONIUM THIOCYANATE AND SODIUM CHLORATE TREATMENTS APPLIED TO R. INERME PLANTS GROWING IN CLOSE PROXIMITY TO ALDERS WITH THE SAME TREATMENTS APPLIED TO PLANTS NOT SO SITUATED

Plot Number	Drench (Pounds Chemical per Acre)	Spray (Pounds Chemical per Acre)	(1) Alders Present		(1) Alders Absent	
			Percent Dead Plants	Percent Dead Stem	Percent Dead Plants	Percent Dead Stem
			Ammonium thiocyanate			
10	2,500		25	37	41	73
11	3,500		45	79	67	94
12	5,000		39	64	54	81
13	1,500	1,000	25	79	55	92
16	2,500	1,000	77	96	62	95
14	3,500	1,500	91	100	87	98
21		2,500	40	92	70	99
20		3,500	55	100	98	100
19		5,000	91	100	97	100
			Sodium chlorate			
1	2,500		8	41	40	68
4	3,500		12	51	25	73
2	5,000		54	83	75	73
26	14,000		17	81	8	68
3	1,500	1,000	70	87	74	84
6	2,500	1,000	31	88	62	86
5	3,500	1,500	58	93	58	90
7		2,500	56	68	54	71
28		2,500	36	95	60	93
29		3,500	100	100	96	99
8		4,000	76	93	85	98
9		5,000	84	99	81	99
27		5,000	59	98	85	99
32	5,000		13	71	39	71
34	5,000		Formal check not performed.			

(1) The word "Alders" is used here as a descriptive term to mean any high brush and includes willows, hawthorne, etc. The total number of plants of the latter kinds encountered upon the experimental area was negligible.

TABLE NO. 6

COMPARISON OF EFFECTIVENESS OF AMMONIUM THIOCYANATE AND SODIUM CHLORATE TREATMENTS WITH SIZE OF R. INERME PLANTS

Plot No.	Drench (Pounds Chemical per Acre)	Spray (Pounds Chemical per Acre)	Less than 50 feet of Stem per Plant		Fifty to 200 Feet of Stem per Plant		More than 200 Feet of Stem per Plant	
			Percent Dead Plants	Percent Dead Stem	Percent Dead Plants	Percent Dead Stem	Percent Dead Plants	Percent Dead Stem
			Ammonium thiocyanate					
10	2,500		32	51	80	95	No Plants	
11	3,500		60	79	42	83	78	99
12	5,000		40	71	46	73	71	88
13	1,500	1,000	47	83	50	87	20	87
16	2,500	1,000	84	95	76	98	41	94
14	3,500	1,500	93	100	89	99	77	99
21		2,500	77	99	56	96	78	99
20		3,500	100	100	97	100	79	100
19		5,000	100	100	94	100	86	100
			Sodium chlorate					
1	2,500		56	60	53	40	0	54
4	3,500		32	54	24	75	6	65
2	5,000		57	70	69	95	33	92
26	14,000		0	62	0	84	11	71
3	1,500	1,000	88	93	45	79	67	89
6	2,500	1,000	88	96	50	89	9	83
5	3,500	1,500	70	94	50	89	0	91
7		2,500	61	65	50	72	50	66
28		2,500	89	100	55	91	38	94
29		3,500	100	100	89	97	92	100
8		4,000	86	97	79	97	No plants	
9		5,000	95	100	75	98	83	100
27		5,000	73	93	75	97	78	99
32	5,000		47	77	19	63	100	91
34	5,000		Formal check not performed.					

TABLE NO. 7

RELATION OF LOCATION AND SIZE OF PLANT TO EFFECTIVENESS OF CHEMICAL TREATMENT APPLIED TO R. INERME

Location or Size of Plants	Ammonium thiocyanate			Sodium chlorate		
	Plots Compared	Number Plants Compared	Mean Per-cent Plants Dead	Plots Compared	Number Plants Compared	Mean Per-cent Plants Dead
On stream or plot margins.	10-14 16, 19-21	466	65	1-9 27-29	466	54
Not on stream or plot margins.		353	68		348	66
On stream margins or on soil less than one foot deep above water table.	10-14 16, 19,20	255	59	1, 3-9, 28	184	50
On soil more than one foot deep above water table.		494	68		412	55
In close proximity to alders.	10-14, 16, 19-21	287	54	1-9, 27-29	280	50
Not in close proximity to alders.		532	70		534	64
More than 200 feet of stem per plant.		131	66		130	36
From 50 to 200 feet of stem per plant.	11-14, 16, 19-21	235	69	1-7, 9, 27-29	283	56
Less than 50 feet of stem per plant.		284	75		325	72

Figures for either chemical are, however strictly comparable within each set. Thus, the relationship of effectiveness of ammonium thiocyanate to proximity of alders is accurately given, but the relative effectiveness of ammonium thiocyanate and sodium chlorate upon R. inerme plants growing under these circumstances is represented with only fair accuracy. The table does not, however, pretend to compare plants growing on stream margins with those growing in proximity to alders.

The information presented in Table No. 7 permits the following conclusions:

1. R. inerme plants growing upon very wet sites are relatively less easily killed with either chemical than members of the same species growing upon ground that is only moderately moist.

2. Excessive soil moisture is much more harmful to the effectiveness of ammonium thiocyanate than to that of sodium chlorate.

3. The presence of high brush, here typified by alders, is very detrimental to the efficiency of chemicals applied as herbicides to R. inerme.

4. Large R. inerme plants are more resistant to chemical treatment than small plants of the same species. It will be recalled that the area within plot was uniformly treated. Thus, each plant received chemical in quantity

proportionate to its spread. This being true, it might be expected that plant size would not influence the effectiveness of the treatment. The results show, however, that the quantity of chemical necessary to produce death increases more rapidly than does the size of the plant.

5. The efficiency of sodium chlorate decreases more rapidly than that of ammonium thiocyanate as the size of the treated plant increases. When the physical characteristics of large and small _R. inerme_ plants are compared, this last observation offers striking evidence of the difference between the modes of action of the two chemicals.

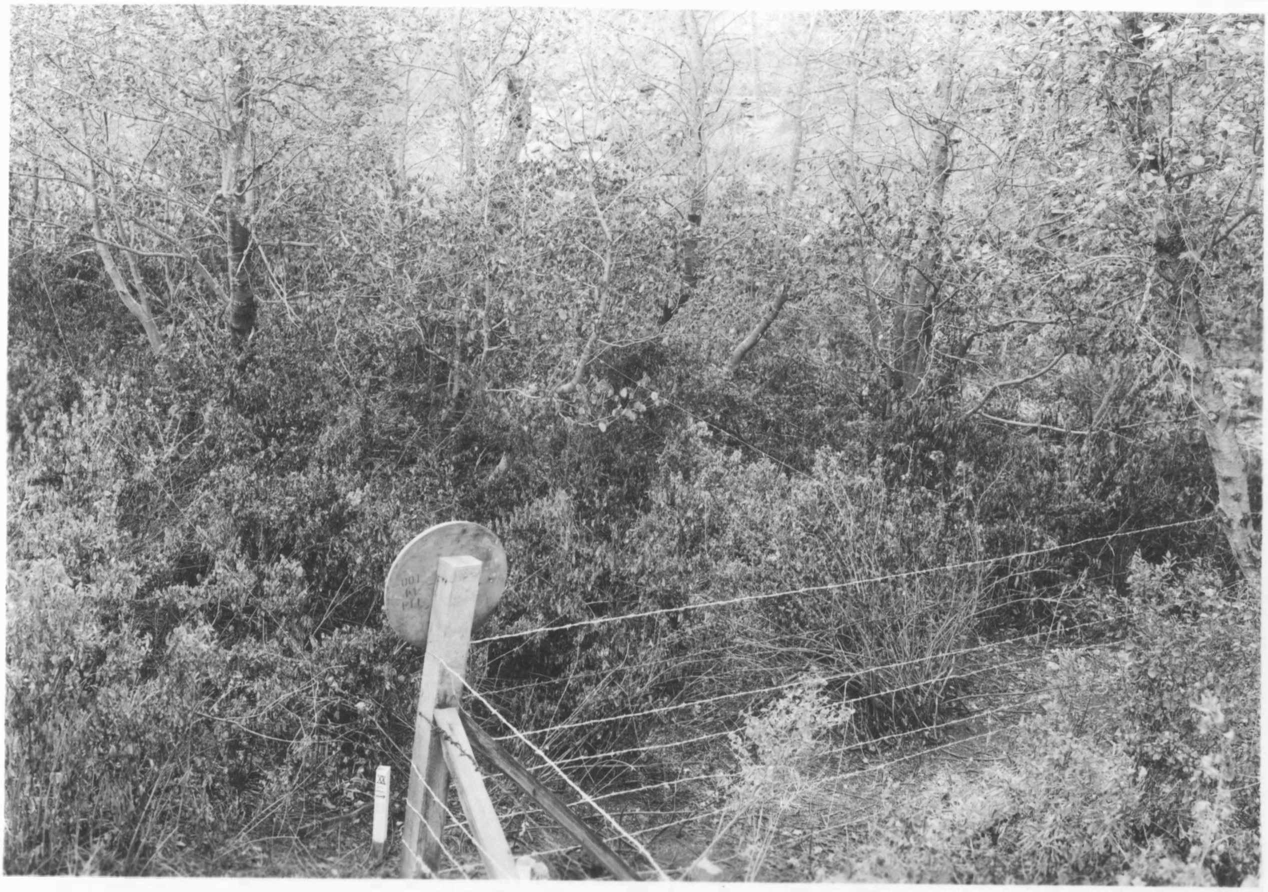
The base of nearly every large _R. inerme_ plant is enveloped in a mound of dead twigs, stems, and leaves. This dead material virtually constitutes a thatch of absorbent material which prevents the chemical solution from making direct contact with the living crown of the plant. The larger the plant is, the greater is the accumulation of debris. Small plants are practically without such protection. If a toxic chemical incapable of translocation within the plant body is applied to _R. inerme_, the facts just set forth should lead to the expectancy of just such results as were shown by sodium chlorate; namely, that most of the small plants would be killed while the crowns of many of the large plants would survive. If, however, the chemical is of such a nature that it can be translocated within the plant, it is logical to expect that direct contact with the crown is not as essential as in the former instance. The data indicate that ammonium thiocyanate behaves in such a manner. A study of the plots yielded an abundance of evidence in confirmation of this distinction. Thus, for example, plants heavily damaged but not killed by ammonium thiocyanate subsurface soil drenches exhibited the greatest injury at the outer ends of the stems. While plants subjected to corresponding sodium chlorate treatments examined early in the spring showed that the heaviest damage was confined to portions of the roots and the lower ends of some of the stems. Obviously, stems severely injured at the base in this manner were destined to die as soon as their period of winter dormancy was past. If the spring check had been performed at a later date the mode of their death would not have been as instantly discernible.

Regardless of the nature of the chemical chosen, it is self-evident that direct contact with the most vital part of the plant is desirable. For _R. inerme_ at least, and probably all species of Ribes, the most important vital point is the crown of the plant and the roots and stems immediately joining it.

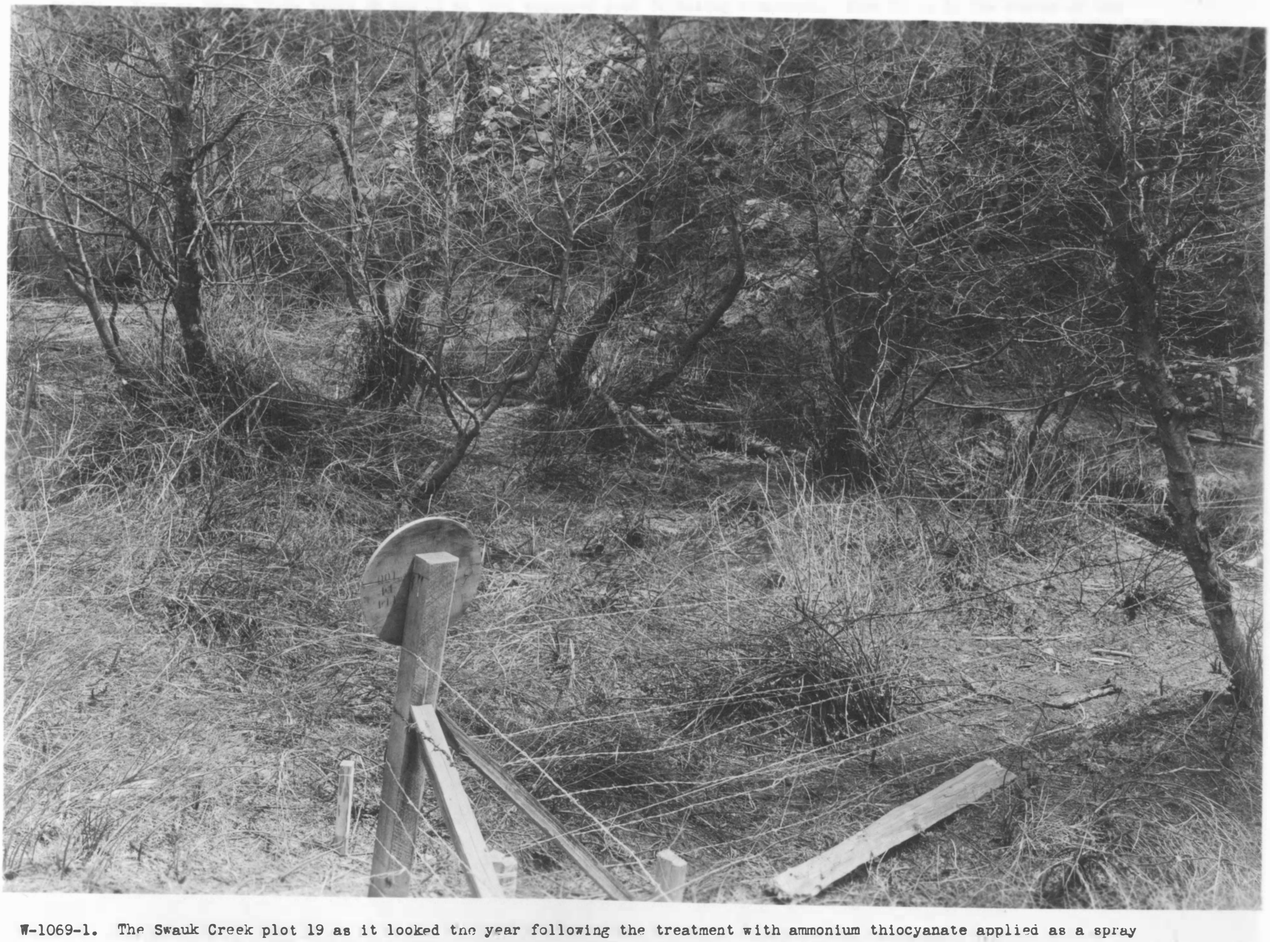
<u>Comparison of Ammonium Thiocyanate and Sodium Chlorate. Proper Dosage.</u>

Comparison of the two chemicals and estimation of minimum dosage will be made upon the basis of spray treatments alone, because as has been previously stated, the subsurface drenches were all applied too deeply in the soil to permit maximum effectiveness. Attention is again called to the fact mentioned before, that the spray treatments were really in effect spray and soil surface applications.

Table No. 8 has been compiled from the data taken in the May and August checks, and together with Figures 1 and 2 furnish the most satisfactory basis for comparing the effectiveness of the two chemicals. Photographs Nos.



W-1069. View of the Swauk Creek plot 19 prior to treatment.



W-1069-1. The Swauk Creek plot 19 as it looked the year following the treatment with ammonium thiocyanate applied as a spray at the rate of 5,000 pounds per acre.

W-1271. View of Swauk Creek plots 20 and 21 as they appeared year following treatment. Plot 20 is in the center of the foreground. Plot 21 is left of the center of foreground. Live R. inerme at the edge of the high brush at the left of center is outside of plot 21. The treatment data are given in Table No. 1.

W-1273. Margin of Swauk Creek plot 21, showing close-up of live R. inerme pictured in photograph No. W-1271. The picture shows contrast between treated and untreated R. inerme year following application of ammonium thiocyanate spray.

W-1068. General view of Swauk Creek plots 26 to 29. Plot 29 in foreground. The picture was taken prior to treatment in 1932.

W-1068-1. Same area as shown in photograph No. W-1068. Picture taken in 1933.

W-1069, W-1069-1, W-1271, W-1273, W-1068 and W-1068-1 illustrate the type of damage produced by ammonium thiocyanate and sodium chlorate spray. It will be seen that the May and August checks are in fair agreement with regard to the effectiveness of the ammonium thiocyanate treatments, but that some differences exist between the corresponding sets of figures for sodium chlorate. The August check apparently indicates that some plants damaged by treatment but alive at the time of the May check died before the later check was performed. This is highly probable, especially in the light of what has been said regarding the mode of injury by chlorate. It is also possible, however, that the differences are due in part to the fact that segments of bark were peeled from all stems whose condition was doubtful at the time the May check was performed. In this manner some live stem existing at that time was destroyed, and unless new stems appeared during the growing season some of these "live" plants would be checked as dead in the fall. Whatever the reason for the differences in the table, it will in all probability be discovered in a further study of the plots planned for the coming season. For the present the differences need not greatly interfere with the comparison of the two chemicals.

TABLE NO. 8

COMPARISON OF EFFECTIVENESS OF AMMONIUM THIOCYANATE AND SODIUM CHLORATE SPRAYS AS SHOWN BY CHECKS PERFORMED IN MAY AND AUGUST

Pounds Chemical Per Acre	Number of Plants Treated	Feet of Stem Treated	May Check Percent Plants Dead	May Check Percent Stem Dead	August Check Percent Plants Dead	August Check Percent Stem Dead
Ammonium thiocyanate						
2,500	84	17,033	68	98	69	100
3,500	70	19,030	91	100	87	100
5,000	61	8,049	95	100	92	100
Sodium chlorate						
(1) 2,500	110	20,645	52	90	82	99
3,500	71	7,610	96	99	100	100
4,000	80	5,456	83	97	95	100
(1) 5,000	120	17,256	80	99	97	99

(1) Each set of figures are derived by combining data from two plots.

All other values reported in this table are each taken from data for single entire plots.

Before proceeding further with the present subject, it is necessary to point out that the ammonium thiocyanate used in these trials was a crude experimental produce containing only approximately 80 percent of the dry

chemical while the sodium chlorate used was nearly pure. Thus, only about eight-tenths as much ammonium thiocyanate was actually used as is reported in the tables. Since the experiments were started it has been learned that ammonium thiocyanate if produced upon a commercial basis would contain not less than about 95 percent of the pure salt. The ammonium thiocyanate figures given in the tables, if calculated upon the basis of 95 percent pure chemical would become 2,100, 2,950, and 4,200 pounds per acre instead of 2,500, 3,500, and 5,000 pounds per acre respectively.

In Figure 1 the weights of ammonium thiocyanate shown in the tables are represented by the corresponding weights of 95 percent pure chemical.

Both Figures 1 and 2 include data taken from field studies performed prior to 1932 as well as those begun in that year, and thus present a graphic summary of the present knowledge of this unit regarding the effectiveness of the two chemicals applied as sprays to R. inerme.

Several features of these figures are of special interest. It will be observed that neither curve passes through the origin but intercepts the horizontal axis a little to the right of that point. This means that unless a certain minimum quantity of chemical is applied no plant kill results. It will also be observed that in common with all similar graphs each of the curves approach the lines representing 100 percent plant kill asymptotically. A point can, therefore, be located upon each curve where, for all practical purposes, the slope of the curve becomes and remains zero. Such a point represents the practical maximum plant kill attainable by the chemical and method of treatment used. That is to say, if more chemical is applied than that quantity represented by the position of the point virtually no increase in percentage of plant kill will follow. If the horizontal distance from the last named point to the vertical axis is equal to the length of the scale from 0 to 100 percent plant kill, as it is in the two figures, a point can be found where the slope of the curve is one. This point is unique in that it represents the maximum efficiency attainable with the chemical and method concerned. For, in passing from left to right along the curve, the percentage of plant kill increases more rapidly than the quantity of chemical required until the point is reached where the slope of the curve is one. Beyond that point the rate of increase in the percentage of plant kill is less than the rate of increase of the quantity of chemical required. Thus, if chemical is applied to the area covered by the plants at a rate greater or less than that corresponding to the location of the point described, the treatment is wasteful of chemical. Knowledge of the location of this point is essential to the choice of the proper dosage of chemical to be applied to an area which is to be worked more than once. Since it is evident, that neither of the chemicals under consideration are capable of yielding 100 percent R. inerme eradication by means of one spray treatment, more than one working must be contemplated wherever they are to be used in that manner.

Figure 1 shows that when ammonium thiocyanate is used as a spray on

FIGURE 1

RELATION OF R. INERME PLANT KILL TO DOSAGE OF AMMONIUM THIOCYANATE APPLIED AS A SPRAY

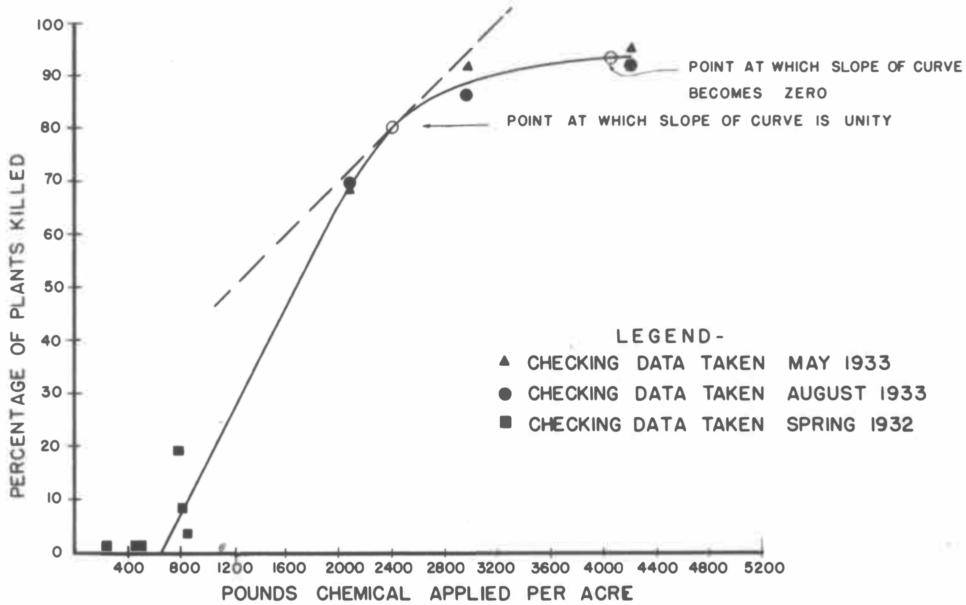
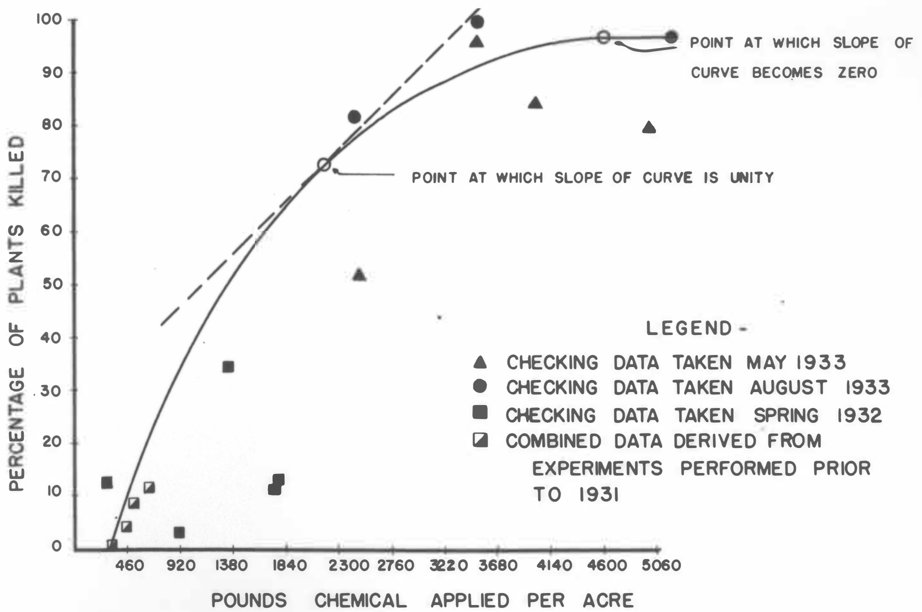


FIGURE 2

RELATION OF R. INERME PLANT KILL TO DOSAGE OF SODIUM CHLORATE APPLIED AS A SPRAY



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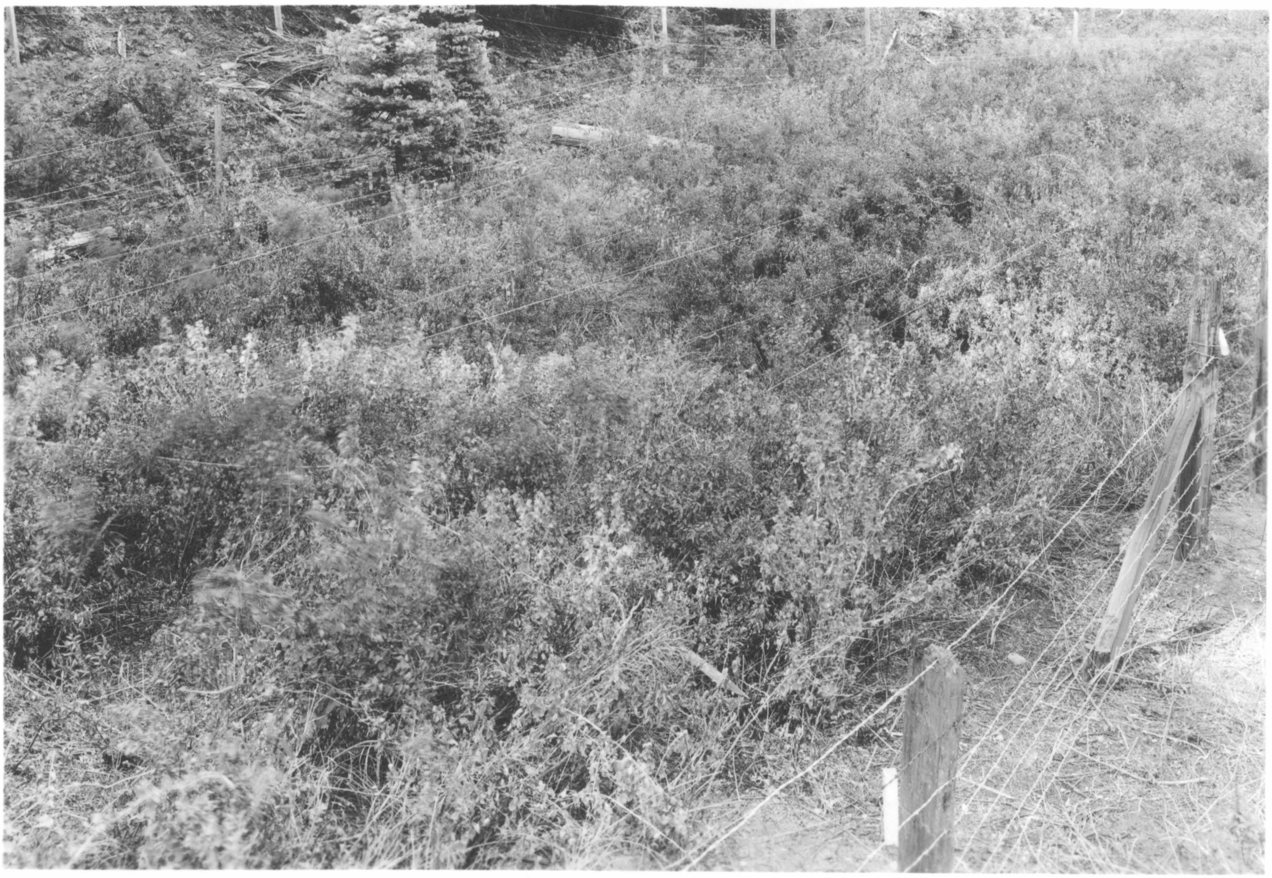

W-1070. Swauk Creek plots 17, 18 and 31. The picture was taken prior to treatment in 1932.

W-1070-1. Same as photograph No. W-1071. The picture was taken in 1933.

W-1074. General view of Swauk Creek plot No. 34 prior to treatment with a sodium chlorate foliage and soil surface drench.

W-1074-1. Same as photograph No. W-1074. The picture was taken in the spring following the chemical application.

R. inerme, approximately 700 pounds must be applied per acre or 4.35 pounds per square rod of ground covered before any plant kill may be expected. The maximum plant kill attainable by a single treatment is about 94 percent and calls for the use of 4,000 pounds of chemical per acre or 25 pounds per square rod. Maximum efficiency is obtained at 80 percent R. inerme plant kill, and requires the application of 2,400 pounds of 95 percent pure chemical per acre or 15 pounds per square rod.

The corresponding values for sodium chlorate taken from Figure 2 are: minimum quantity of chemical necessary to produce plant kill, approximately 300 pounds per acre or 1.88 pounds per square rod. Maximum plant kill attainable by single treatment, about 97 percent. This requires the use of 4,600 pounds of chemical per acre or 28.75 pounds per square rod. Maximum chemical efficiency 72.5 percent plant kill to be obtained by the application of 2,160 pounds of sodium chlorate per acre or 13.5 pounds per square rod of area treated.

Minor Features of the 1932 Field Program

Brief reference will now be made to the progress of the minor field studies undertaken in 1932.

The extremely poisonous arsenic compounds always have been and probably always will be excluded from the list of chemicals that can be employed in large scale destruction of Ribes. It is conceivable, however, that special conditions might at some time arise when a cheap and effective chemical of this class could be used safely in small scale work. This possibility prompted the three sodium arsenite subsurface soil drench treatments applied last year. The results of these experiments recorded in Table No. 1 and photographs W-1070 and W-1070-1 testify to the effectiveness of this chemical. Subsurface soil drenching was chosen as the method of application in order to examine the possibility of lessening the hazard of poisoning browsing animals. Analysis of foliage gathered from plants on the plots several weeks after treatment disclosed that dangerous quantities of arsenic had been transported by the plants from the soil to the leaves. No new foliage appeared in 1933, however, and it is barely possible that when vegetation again appears upon the plots the foliage will be free of arsenic. The question of how long the area will remain dangerous to animals after the application of arsenic in these quantities will be determined by continued observation of the plots. Conditions on the plots at the time of the May check indicate that good results could have been obtained with less chemical than was used.

The outcome of the trials of Calcium-Chloron on R. inerme show this chemical to be of no practical use in this work. The checking data are given in Table No. 1.

At the end of the 1932 field season sodium chlorate was applied to two R. inerme plots as a foliage and soil surface drench. The solution was delivered in a straight stream from a small hose nozzle. The results of these trials presented in Table No. 1 show the treatment to be less effective than the corresponding treatments performed by other methods. Views of one of the plots to which sodium chlorate was applied in this manner are shown in photographs W-1074 and W-1074-1.

Table No. 1 included checking data taken from the R. petiolare plants present on the experimental plots. The purpose of the experiments only concerned R. inerme, and the presence of these few R. petiolare plants was purely fortuitous. The figures are given in the table merely for the sake of completeness, since the total number of R. petiolare plants involved in any one treatment was too small to warrant formulation of general conclusions, regarding the effectiveness of the treatment upon this Ribes species.

In 1932, three R. petiolare plants growing near the Methods Camp site of that year were treated with arsenic pentoxide by the tubulation method. These treatments were described in Table No. 4 of the 1932 annual report submitted by this project. Inspection in 1933 disclosed that although much of the stem had been killed by the chemical, all three plants were still alive. It was evident that while the chemical had been moved considerable distances within the plants, its distribution had not been perfect in the region of the crowns.

When an attempt was made this year to check the other individual bush treatments reported in the same table as the foregoing, it was found that in clearing the area for a CCC camp site, the experimental plants had been destroyed.

B. LABORATORY AND GREENHOUSE WORK SEPTEMBER 1932 to JUNE 1933

The greenhouse chemical experiments undertaken, during the period September 1932 to June 1933, were largely an extension of the sodium chlorate dosage tests which had been commenced the previous year. R. roezli plants were killed by dosages ranging from 0.52 to 1.65 pounds per square yard (2516.8 to 7986.0 pounds per acre). R. nevadense plants were treated with equivalent volumes of one pound of sodium chlorate per gallon of water as follows: (1) applied to tops alone, and (2) applied to soil alone. Twice this dosage was applied to a third group of R. nevadense plants as a combination top and soil treatment. Results of these tests showed that the soil and top combination treatment was 100 percent effective. In equivalent dosages soil treatment was more effective than top treatment. In another experiment sodium fluoride was compared with sodium chlorate as a soil poison. The latter proved to be much more toxic. In a series of tests involving the decapitation of R. roezli with subsequent chemical treatment of the mutilated crowns, sodium fluoride proved to be 100 percent effective. Detailed data relative to these investigations are given in research reports, Serial Nos. 21, 25 and 24.

Greenhouse experiments were conducted in the care and handling of Ribes seedlings, stem cuttings, and mature plants, and in the germination of Ribes seed. The results of this work have been recorded in research reports, Serial Nos. 26a, 44, 44a, 44c, 44d, 44e, and 55. A special assignment of the leaf histology of R. petraeum var. Red Hollandsk Druerips and R. sativum var. Fay's Prolific was undertaken and reported in final form in research report Serial No. 42. An aeration unit was installed in the Berkeley greenhouse for use in connection with the growth of Ribes plants in water culture medium. This unit has been eminently satisfactory and has materially improved the quality of greenhouse grown plants.

Laboratory work comprised analyses of specimens of field Ribes plants gathered from the 1932 experimental areas, and a study of the efficiency of

synthetic resins as binding agents in the process of flameproofing cloth. Copper determinations were made on material selected from tubulation tests, and analyses for arsenic were completed on leaves of Ribes and associated brush from the arsenic treated plots at Swauk Creek, Wenatchee National Forest, Washington. Quantities of arsenic which would be definitely lethal to grazing animals were found in leaves of all species collected.

An extensive study was made of the method for fireproofing wearing apparel with the object of determining the permanence of the treatment subsequent to field wear and laundering, and of improving, if possible, the binding agent. Particular attention was paid to synthetic resins. No substantial improvement was made in the treatment. It was determined, however, that the initial period during which the cloth is highly flameproof might be prolonged by rinsing the clothing in cold water without soap and rubbing as little as possible. Data relative to this general study have been presented in research reports Serial Nos. 38, 39, 40 and 41.

In May 1932 a special problem was assigned to this laboratory by Mr. S. B. Detwiler, Principal Pathologist in Charge. This work concerned the possibility of reducing the fire hazard of the chlorates by the addition of carbonates and bicarbonates of the alkaline and alkaline earth metals. Concurrently with the combustion experiments, toxicity tests of the various mixtures were made on Ribes and Nitella. This work indicated that a mixture of sodium chlorate and sodium bicarbonate possessed a toxicity equivalent to the chlorate content of the mixture, and that the presence of bicarbonate definitely slowed the combustion rate of chlorate and organic materials. The detailed results of laboratory work are available in research report Serial No. 46.

C. CHEMICAL FIELD EXPERIMENTS OF 1933

Idaho Work

1933 Ammonium Thiocyanate Plot Experiments at Clarkia, Idaho

Field experiments designed to extend the investigation of ammonium thiocyanate as an herbicide were undertaken in 1933 at Clarkia, Idaho. The purpose of the work was to gather more information regarding the effectiveness of this chemical upon R. inerme, growing in an Idaho stream type area, and also to test its action upon R. petiolare under the same environmental conditions. The site selected for the trials lies within a bend of the St. Maries River about one mile downstream from the town of Clarkia. The area is densely covered by an overstory of willows and other high brush. R. petiolare and R. inerme are well represented on the site. Some R. lacustre is also present.

The method of experimentation followed was essentially the same as that employed in the 1932 spray tests at Swauk Creek in the Wenatchee National Forest, except that the chemical was applied directly to the soil as well as to the foliage. An orchard spray gun having an adjustable nozzle was used for making the applications. The solutions were sprayed upon the foliage and ground as uniformly as possible. Otherwise inaccessible plant crowns were treated by

W-1263. Operation of an adjustable spray gun employed in treating the 1933 experimental plots at Clarkia, Idaho. The photograph shows the cone of spray used to drench foliage.

W-1264. Same subject as photograph No. W-1263. The picture shows a fine straight stream used in applying solution to otherwise inaccessible plant crowns.

directing the flow of solution at them in the form of a straight fine stream. A gasoline engine driven pump was used for handling the chemical. The solution pressure at the pump outlet was kept at approximately 50 pounds per square inch. The method of operating the gun is shown in photographs Nos. W-1263 and W-1264.

The standard size for the plots treated in 1932 was 33 feet by 49.5 feet or .0375 acres. This year, in order to facilitate checking by milacre sections according to the method developed at Swauk Creek, the plot dimensions for the thiocyanate tests were changed to 33 feet by 52.8 feet or .04 acres each.

In addition to the complete coverage treatments applied to the standard plots, a selective spray was used experimentally upon the Ribes growing in an irregularly shaped area adjacent to the regular plots. Treatment data for this section of the work are given in Table No. 9.

Pretreatment photographs of the 1933 experimental area were taken and follow-up pictures to be taken in 1934 will be used to assist in the study of the experiments.

A series of large scale tests of selective treatments involving the use of sodium chlorate and ammonium thiocyanate sprays were undertaken by the methods project in the same general locality and at the same time as those reported here. Certain of the treatments in the two sets of experiments were designed to parallel each other with respect to chemical dosage per unit area. Comparison of the complete data to be taken from these separate experiments should afford a basis for interpreting the future findings of either type of work into the terms of the other.

TABLE NO. 9

AMMONIUM THIOCYANATE SPRAY EXPERIMENTS CONDUCTED AT CLARKIA, IDAHO, July 1933

Plot Number	Type of Application	(1) Lbs. Chemical Per Acre	Gals. Solution Used Per Acre
1	Complete foliage coverage	500	(2) 500
2	do	750	(2) 500
3	Complete foliage and soil coverage	1,000	1,000
4	do	2,000	1,000
5	do	3,500	2,000
6	do	5,000	2,000
(3) 7	Selective coverage. Solution applied to Ribes foliage and soil at plant bases.	2,000	1,000

(1) The quantities reported here refer to 80 percent ammonium thiocyanate. The corresponding quantities of 95 percent chemical can be calculated by multiplying the figures given in the table by 0.842.
(2) This quantity of solution was insufficient to wet foliage to point of dripping.
(3) Total area of this plot was 0.125 acre. Area actually treated 0.089 acre. Area of other plots listed 0.04 acre each.

Spray Tests of Chlorate-Bicarbonate Mixtures on R. petiolare at Clarkia, Idaho

Location and description of area. The area selected for tests of the toxicity of the chlorate-bicarbonate mixture was located along the St. Maries River about one-half mile downstream from Clarkia. Three plots, each 66 feet by 33 feet, were staked within the area. These plots were similar as to brush conditions and soil character and were thickly populated with vigorous, mature R. petiolare plants. The brush on these plots consisted of wild cherry, willow, and alder with a scattered overstory of conifers. Some Ribes plants overhung the edge of running water, some grew along the edge of or within a muddy swale, and the remainder were found under brush or in more or less direct light on soil of high moisture content. Thus, the plants occurred under the variety of conditions normally tolerated by this species.

Method of working. The plots were treated on August 7, 8 and 9. A small power unit was used for spraying the plots, which were covered uniformly with a definite volume of solution and weight of chemical per unit area of ground surface. The aerial parts of all brush, Ribes included, were sprayed with chemical solution to a height of about six feet. To assist in attaining uniform coverage each plot was subdivided by string lines into 15 sections; thus, on any one plot, each of the fifteen subdivisions received the same volume of solution and weight of chemical.

TABLE NO. 10

SPRAY TESTS OF CHLORATE-BICARBONATE MIXTURE ON R. PETIOLARE, ST. MARIES RIVER, CLARKIA, IDAHO 1933

Plot Number*	Chemical	Conc. in Pounds Per Gal. Solution	Quantities Used: Per Square Rod: Gallons Soln.	Per Square Rod: Pounds Chem.	Per Acre: Gallons Soln.	Per Acre: Pounds Chem.
	Sodium chlorate plus	0.555		5		800
8	Sodium bicarbonate	1.110	9.0	10	1,440	1,600
	Sodium chlorate plus	0.943		10		1,600
9	Sodium bicarbonate	0.476	10.5	5	1,680	800
	Sodium chlorate plus	0.488		10		1,600
10	Sodium bicarbonate	0.488	20.5	10	3,280	1,600

*Each plot measured 66 feet by 33 feet.

Decapitation Experiments on R. viscosissimum in the Vicinity of Elk River and Emida, Idaho.

On August 1, two plots were located in a R. viscosissimum area along a slope adjacent to Johnson Creek, a tributary of Elk Creek, Elk River, Idaho. The experimental area is reached by traveling from the 1933 ECW camp on Elk Creek about four miles toward Elk Basin over the logging railroad of the Potlatch Timber Company, to the confluence of Johnson and Elk Creeks. From that point a blister rust service trail is followed for about one-third of a mile up Johnson Creek to the experimental area. The plots 33 feet wide, were located

on the west side of Johnson Creek. The long edge of the plots ran parallel to the stream for a sufficient distance to include 100 large R. viscosissimum bushes. Finely ground copper sulphate was used to treat the mutilated crowns of bushes on Plot 1; sodium fluoride was used on Plot 2. All small Ribes plants were hand pulled from within the plot boundaries; chemical treatment being reserved for the large bushes. It might be noted that few of the bushes selected for chemical treatment would have caused much difficulty to a hand pulling crew. In this respect, the bushes were considered to be unsatisfactory for the tests undertaken.

In treating the bushes, a Pulaski was employed to cut through the bush crown below the point at which the stems branched. In most instances the crown was subjected to additional laceration. The exposed crown was then wet with water, and three to four ounces of dry chemical were sprinkled over the mutilated crown and root surface. One hundred bushes were treated in this manner with sodium fluoride and the same number with copper sulphate.

Examination of the plots on September 27 showed apparent 100 percent efficiency.

On August 17, an additional test of this decapitation treatment was made near Emida, with the assistance of a Ribes eradication crew under the supervision of an ECW camp superintendent. The experimental area was adjacent to Bob's Creek near Emida, Idaho. Thirty pounds of ammonium thiocyanate and five gallons of water were used in the course of a full day's work and accounted for some 150 R. viscosissimum. In no case was chemical treatment applied before an attempt had been made to hand pull the bush. Whenever a stubborn bush was encountered, it was cut off through the crown by means of a Pulaski or a pair of long-handled pruning shears. About four or five ounces of ammonium thiocyanate were then applied to the exposed crown and root tissue. The crewmen were unanimous in their approval of the method as a time and labor saving device. The pruning shears were voted more effective than the Pulaski for topping the plants. The ground covered in the course of this experiment was subsequently marked for inspection next year.

Experiments on R. cereum in the Vicinity of Spokane, Washington

On September 21, an experimental plot on R. cereum was established in the vicinity of Garden Springs, about $2\frac{1}{2}$ miles southwest of Spokane. Many of the bushes were very large and comprised the only brush cover on the area. The soil was a moist-well-drained light loam, and sloped gently upward to the foot of a sheer basalt cliff. Basalt outcroppings were noted within the experimental area.

Ammonium thiocyanate in concentration of 2.1 pounds per gallon of solution was applied to the soil about the base of 65 bushes at the rate of 0.5 gallons per square yard. This treatment amounted to 5,082 pounds per acre. Six of these bushes were decapitated before chemical treatment by means of a pair of long-handled pruning shears. Individual bushes or clumps were tagged with a short length of "Indestructo" label showing the bush or clump number and the volume of solution applied. This area will be checked in the spring of 1934.

California Work

Location and Description of Experimental Area.

Three areas on the Stanislaus National Forest in the vicinity of Strawberry, California were selected for the experimental applications. The locations of these areas are as follows: Area I, NW ¼ Section II, T.5 N., R. 18 E.; Area II, NE ¼ Section 34, T. 4 N., R. 18 E.; and Area III, Section 13 T. 5 N., R. 18E. Area I and Area II are R. roezli sites, and Area III is an R. cereum site.

Area I is reached by driving two miles north of Strawberry on the Sonora Pass Highway, and an additional two miles east on a logging grade to the end of the road. The area is about six chains to the southeast at the head of a steep, short side-drainage, at an elevation of about 6,300 feet. The area, which is quite open, has a northwest exposure and a slope of about 15 percent. It is divided into ten plots. Eight of these are a tenth of an acre in area, the remaining two are 0.05 and 0.07 acres respectively. The soil of plots 2, 3, 6 and part of 1, 5, 9 and 10 is very moist, as these plots are traversed by flowing water or are adjacent to springs. The soil of these moist plots is a rich black loam for a depth of three to six inches. At a greater depth the soil is a loose, coarse sand. The soil of plots 4, 7 and 8 and part of 1, 5, 9 and 10 is considerably drier. The soil is covered by a layer of litter and duff one to two inches thick. Below the duff, there is a layer of loose sandy loam followed by a deep layer of coarse sand.

Spray and drench applications of sodium chlorate, mixtures of sodium chlorate and sodium bicarbonate, ammonium thiocyanate, and zinc ammonium chloride were made on this area. Mutilated crowns of decapitated bushes were treated with aqueous ammonium thiocyanate and with solid sodium fluoride. To prevent distrubance by cattle, these plots were fenced. To minimize fire hazards, the chlorate solutions were applied to plots bordering the stream, after the removal of accumulations of combustible material from the immediate vicinity of the bushes. Bushes growing under large logs were not treated. The plots treated with ammonium thiocyanate and zinc ammonium chloride were cleared of accumulations of limbs and small windfall. Large windfall and litter of bark and needles were not disturbed.

Area II is reached by driving 3.6 miles north of Strawberry on the Sonora Pass highway, then turning east on a logging grade road and driving an addisional 2.4 miles. The experimental area is adjacent to the south side of the road, and a chain south of Cow Creek. The area is a part of an open, logged-over bench that slopes gently to the creek. The plots are at an elevation of 6,000 feet and have a northwest exposure. The soil is a loose sandy loam. The surface six inches is dry. The moisture content increases slowly at depths below six inches, but even at two feet it is below optimum. The roots of the bushes are at a depth of 8 inches to 20 inches with the major portion at one foot. This area was selected for the oil treatments on R. roezli.

Area III was selected for the application of sodium fluoride to the mutilated crowns of R. cereum. It may be reached by driving to the end of the Gooseberry Camp road and then walking 57.5 chains up the Burst Rock Trail. A marker on the trail indicates that the plot is 175 feet North 30° East. It is part of an open, sunny, west-facing slope which is covered with wild cherry, snow brush, and large clumps of R. cereum. The elevation is about 7,000 feet. The soil, which is covered with a loose litter of needles and twigs, is a very loose, porous, sandy loam. The soil moisture is slight at three inches, moderate at a depth of two feet, and increases only slightly with increasing depth.

Methods of Applying Spray and Soil Drenches and of Making Treatments of Mutilated Crowns.

Live stem data were taken on the plots before treatment. The plots were divided with string lines into narrow lanes. One lane was worked at a time, the bushes being sprayed and then drenched by applying the solution with a watering can uniformly over a measured area of ground about the base of the bush. With this method of drenching, it is difficult to get continuous wetting of the ground with less than 2,000 gallons per acre. The area treated varied with the size of the bush according to the following table:

Size of Bush	Area Treated
1-30 Feet	1-2 Square Feet
30-75 Feet	2-3 Square Feet
75-125 Feet	3-6 Square Feet
125-250 Feet	6-9 Square Feet
250-500 Feet	9-16 Square Feet

The area was measured by means of a frame two feet square divided by cross wires into 16 squares of 0.25 square feet unit area. This frame was mounted on four legs which raised the measuring frame some two feet off the ground. The frame was placed over the bush, and the required dosage distributed over the desired area. When large clumps were encountered, the frame was moved several times in such a way as to cover the entire clump.

The area of ground treated exceeded the aerial spread of most bushes. The dosage figures given on the per acre basis in Table No. 11 are computed for the ground area occupied by Ribes and treated in the course of the experiments. Ribes area approximated 14 percent of the total area. No dosage figures on the per acre basis are given for the Diesel oil drenches, as these were applied to a restricted area adjacent to the crown of the bush. The Diesel oil drenches were applied at the average rate of 1.5 pints per 100 feet of live stem.

The crown applications are summarized in Table No. 12. The chemicals used were powdered sodium fluoride, Diesel oil, and aqueous ammonium thiocyanate (2.5 pounds per gallon of water). In all treatments except that given in Area II, Plot 1 (.27 - .86), the bushes were topped by cutting through the crown below the point of branching. The cut surface of the crown was mutilated with a pruning saw or belt axe before the chemicals were applied. Liquids were poured

TABLE NO. 11

SPRAY AND DRENCH APPLICATIONS TO R. ROEZLI, CALIFORNIA 1933

Plot Number	No. of Bush-es	Linear Feet Stem Treated	Total Area of Plot Sq. Yards	Area Treat-ed Sq. Yards	Date of Applica-tion	Chemical	Conc. Lbs. Per Gal. Water	Quantities Used											
								Spray				Soil Drench				Total Spray and Soil Drench			
								Gals. of Soln.	Lbs. of Chem.	Gals. Soln. Per Acre*	Lbs. Chem. Per Acre*	Gals. of Soln.	Lbs. of Chem.	Gals. Soln. Per Acre*	Lbs. Chem. Per Acre*	Gals. of Soln.	Lbs. of Chem.	Gals. Soln. Per Acre*	Lbs. Chem. Per Acre*
						Sodium chlorate	0.5		4.8		918		7.9		1510		12.7		2428
1	84	5911	242	25.3	Aug. 2	Sodium bi-carbonate	0.75	10.0	7.2	1912	1377	16.4	11.8	3146	2265	26.4	18.9	5058	3642
						Sodium chlorate	1.0		5.2		1609		12.0		3678		17.2		5287
2	88	2437	484	15.8	Aug. 2	Sodium bi-carbonate	0.5	5.5	2.6	1694	805	12.6	6.0	3872	1839	18.1	8.6	5566	2644
						Sodium chlorate	1.0		10.5		1321		53.2		7219		63.7		8540
3a	245	9487	242	35.7	Aug. 3	Sodium bi-carbonate	0.5	11.0	5.3	1391	661	56.0	26.6	7599	3610	67.0	31.9	8990	4270
3b			242	30.0	Aug. 4	Sodium chlorate	1.0	8.5	8.2	1370	1315	47.6	45.7	7695	7388	56.1	55.8	9065	8703
4 (.0-.40)	393	10253	293	44.3	Aug. 7	Zinc ammoni-um chloride	2.0	9.0	15.8	978	1711	18.6	32.7	2033	3578	27.6	48.5	3011	5289
4 (.40-.66)			117	44.0	Aug. 8-9	Zinc ammoni-um chloride	2.0	8.5	15.0	934	1643	37.6	66.2	4138	7283	46.1	81.2	5072	8926
5 (.0-.39)	474	13526	286	74.3	Aug. 9-10	Zinc ammoni-um chloride	2.0	12.5	22.0	818	1438	124.4	155.5	8102	14259	136.9	177.5	8920	15697
						Sodium chlorate	0.5		8.1		816								
6	219	7703	484	48.4	Aug. 4-7	Sodium bi-carbonate	0.75	17.0	12.2	1699	1224	76.6	36.8	7661	3677	93.6	44.9	9360	4493
7 (.0-.59)	220	5249	433	40.2	Aug. 10	Ammonium thiocyanate	2.5	6.0	9.96	721	1197	11.0	18.3	1326	2191	17.0	28.2	2047	3388
7 (.59-.66)			51		Aug. 10	do	2.5	1.5	3.10							3.1			
8 (.0-.66)	396	10743	484	91.2	Aug.11-14	do	2.5	15.0	31.2	794	1318	41.3	85.9	2193	3630	56.3	117.1	2987	4948
9 (.0-.66)	282	5114	484	70.1	Aug. 15	do	2.5	11.0	22.9	760	1261	62.9	130.8	4341	7206	73.9	153.7	5100	8467
2, Area II	288	26795	336		Aug.17-18	Diesel oil	-	17.5				52.7				70.0			
3, Area II	-	-	316		Aug. 21	do	-	24.0				-				24.0			

* Calculated for soil area actually treated.

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TABLE NO. 12

APPLICATION OF CHEMICALS TO MUTILATED CROWNS OF TOPPED R. ROEZLI AND R. CEREUM

Plot Number	Plot Area Square Yards	Bushes Treated Number	Average Feet Live Stem Per Bush	Date of Application	Chemical Used	Applied As	Ounces of Solid or Liquid Applied Per Bush	Total Chemical	Species Treated
Plot 10, Area I	289	72	99	July 24, 31	Sodium fluoride	Dry powder on moistened crown.	1.0	4.5 lbs.	R. roezli
Edge Plot 1, Area I	-	10	167	July 12	do	do	1.0	0.6 lbs.	do
Adjacent to Plot 1 and 2	-	33	73	Aug. 16	do	do	0.5	1.0 lbs.	do
Plot 6 (0-.66) Area I	-	25	142	Aug. 16	do	do	2.0	3.1 lbs.	do
Plot 1 (0-.27) Area II	132	49	107	Aug. 18	Diesel oil	Liquid	1.0	0.4 gals.	do
Plot 1 (.27-.86) Area II	289	79	135	Aug. 18, 21	do	do	8.0	4.9 gals.	do
Plot 5 (.39±.63) Area I	176	35	42	Aug. 15, 16	Ammonium thiocyanate	Solution 2.5# gal.	0.7	1.9 lbs.	do
Plot I Area III	-	40	779	July 25, 29	Sodium fluoride	Dry powder on moistened crown.	1.9*	4.8 lbs.	R. cereum

*Average dose. Most treatments two ounces. Few small bushes received one ounce, and a few very large bushes received four to six ounces.

on the dry crowns and solids were dusted on the crowns, after they had been moistened with water. The bushes in Area II, Plot 1 (.27 - .86) were topped by clipping the branches close to the crown. The crown and short stubs were then treated with chemical after mutilation with an axe or pruning saw. Long-handled pruning shears proved quite satisfactory for the topping of *R. roezli* bushes, but they were inadequate for the large *R. cereum* bushes encountered. The numerous stems of the latter species were clipped close to the ground, the litter was removed and the old stems adjacent to the crown tissue were cut off with an axe or pruning saw. The composite crowns thus exposed occupied an area ranging from a few square inches to over one square foot. The chemical (NaF) was dusted on these exposed crowns.

All the plots were examined on August 30. As the earliest applications were made only a month and the latest applications only a week before this examination, the results are not very indicative of the ultimate kill.

TABLE NO. 13

OBSERVATIONS OF CONDITION OF PLOTS AT END OF SEASON

Plot Number	Date Treated	Observations
Area II	Aug. 18	No sprouting
Diesel oil plots	Aug. 21	No sprouting
Area III, Plot 1	July 25,29	Vigorous sprouting on all R.cereum crowns
Area I, Plot 1	Aug. 2	Most bushes releafing from branch tips.
Area I, Plot 2	Aug. 2	Most bushes releafing from branch tips.
Area I, Plot 3a	Aug. 3	Big clumps not sprouting. Isolated bushes sprouting.
Area I, Plot 3b	Aug. 4	do
Area I, Plot 6	Aug. 4, 7	Most bushes releafing at branch tips.
Area I, Plot 4, 5	Aug. 7, 10	No sprouting
Area I, Plots 7,8,9	Aug. 10, 15	No sprouting evident. Buds appear dead.

Field Tests on the Fire Hazards of Chlorate in Mixture with Organic Material.

During the 1933 field season tests were conducted in California, Washington and Idaho on the fire hazard of mixtures of organic debris and chlorates. Since a detailed summary of this work is available elsewhere (Chemical Investigations Report, Serial No. 61), only the briefest description of the experiments will now be given. Table No. 14 summarizes the California, Washington and Idaho work. The California tests were conducted between August 19 and August 29, the Idaho work on August 16, 17 and 18, and the Washington tests on August 23, 24 and 25. Combustion mixtures were placed in shallow milk pans and exposed to the direct rays of the sun. The samples were protected from wind currents by placing them in a sheltered location and by the erection of a tarpaulin as a windbreak whenever needed.

TABLE NO. 14

IGNITION TESTS OF CHLORATES AND COMBUSTIBLE MATERIALS UNDERTAKEN IN 1933

Location of Experiment	Chemicals Used in Mixture	Organic Material Added
Stanislaus N.F. Calif.	Sodium chlorate	Dry rotten wood, 30 mesh.
do	do	Red fir needle litter, 30 mesh.
do	do	Aspen leaf litter, coarsely ground.
do	do	Aspen leaf litter, 30 mesh.
do	do	Fibrous wood punk, 30 mesh.
do	do	Wood punk, coarsely shredded.
Clarkia, Idaho	do	White pine wood flour, 30 mesh.
Blewett Pass, Wash.	do	White pine wood flour, 30 mesh.
Stanislaus N.F. Calif.	Sodium chlorate + sodium bicarbonate	Ditto (see sodium chlorate above).
Clarkia, Idaho	do	White pine wood flour, 30 mesh.
Blewett Pass, Wash.	do	White pine wood flour, 30 mesh.
Stanislaus N.F. Calif.	Sodium chlorate + calcium chloride	Ditto (see sodium chlorate above).
Clarkia, Idaho	do	White pine wood flour, 30 mesh.
Blewett Pass, Wash.	do	White pine wood flour, 30 mesh.
Stanislaus N.F. Calif.	Sodium chlorate + sodium nitrate	Dry rotten wood, 30 mesh.
do	do	Red fir needle litter, 30 mesh.
do	do	Aspen leaf litter, 30 mesh.
Clarkia, Idaho	do	White pine wood flour, 30 mesh.
Blewett Pass, Wash.	do	White pine wood flour, 30 mesh.
Stanislaus, N.F. Calif.	Sodium nitrate	Dry rotten wood, 30 mesh.
do	do	Red fir needle litter, 30 mesh.
Clarkia, Idaho	Sodium chlorate + zinc chloride	White pine wood flour, 30 mesh.
Blewett Pass, Wash.	do	White pine wood flour, 30 mesh.
Stanislaus N. F. Calif.	Sodium chlorate + ammonium thiocyanate	Red fir needle litter, 30 mesh.
do	do	Aspen leaf litter, 30 mesh.
do	do	Dry rotten wood, 30 mesh.
Stanislaus N. F. Calif.	Sodium chlorate + sodium bicarbonate + ammonium thiocyanate	Aspen leaf litter, 30 mesh.
do	do	Dry rotten wood, 30 mesh.
Stanislaus N. F. Calif.	Atlacide + ammonium thiocyanate	Red fir needle litter, 30 mesh.
do	do	Aspen leaf litter, 30 mesh.
do	do	Dry rotten wood, 30 mesh.
Stanislaus N. F. Calif.	Sodium chlorate + calcium chloride + ammonium thiocyanate	Aspen leaf litter, 30 mesh.
do	do	Dry rotten wood, 30 mesh.
Stanislaus N. F. Calif.	Sodium chlorate + sodium nitrate + ammonium thiocyanate	Aspen leaf litter, 30 mesh.
Stanislaus N. F. Calif.	Sodium nitrate + ammonium thiocyanate	Aspen leaf litter, 30 mesh.

No spontaneous combustion occurred in mixtures of organic material with sodium chlorate, sodium chlorate and sodium bicarbonate, sodium chlorate and calcium chloride, sodium chlorate and sodium nitrate, or sodium chlorate and zinc chloride.

When ammonium thiocyanate was added to these mixtures, however, spontaneous combustion invariably occurred. The Atlacide-thiocyanate mixture ignited more readily than any of the others, but the burning was intermittent and confined to the flaming off of the surface of the sample unless the layer of combustible material was thin. No appreciable difference could be observed in the rate of ignition of Atlacide samples under glass and in direct sunlight. When finely pulverized samples were spread in a thin layer on the soil in direct sunlight, only the Atlacide samples ignited.

The previous contention that Atlacide is more liable to ignite spontaneously than straight sodium chlorate has been verified by these experiments. The slower rate at which Atlacide mixtures burn, once started, has also been confirmed. Since all tests were conducted on or after August 12, when the intensity of ultra-violet light in the solar spectrum is considerably less than it would be in June or early July, these tests also confirm indirectly the need of ultra-violet light as a promoter of spontaneous ignition. It is suggested, therefore, that the use of chlorate mixtures other than those containing an hygroscopic chloride present little or no hazard of spontaneous combustion after the advent of the partially hazy days of August. The chlorate-bicarbonate mixtures burned somewhat more slowly than the straight sodium chlorate but more quickly than the Atlacide. No spontaneous ignition took place in the chlorate-bicarbonate mixtures except when ammonium thiocyanate was added. Unless bicarbonate is added to sodium chlorate in proportions greater than one to one no significant lowering of the general hazard of field work can be expected.

Recheck of Oregon R. erythrocarpum Plots, 1933

The *R. erythrocarpum* plots treated in 1930 and 1931 with Atlacide and Diesel oil respectively, were examined in September 1933. These plots are located in Crater Lake National Park, one mile east of Government Camp on the Bend road.

A cursory examination of the Atlacide plots treated in 1930 showed that the results, given in Table No. 15, were substantially the same as those reported in 1931.

TABLE NO. 15

1933 RECHECK OF R. ERYTHROCARPUM PLOTS

Plot Number	Chemical	pH	Surviving		Percent Kill	
			Bushes	Feet Stem	Bushes	Live Stem
IA (0-1)	Atlacide 15 %	6.5	2	2	99+	100
IA (1-2)	do	4.5	0	0	100	100
IA (2-3)	Atlacide 30%	6.5	0	0	100	100
IB (2-3)	do	4.5	0	0	100	100
IB (1-2)	Atlacide 7.5%	6.5	40	20	80	90
IB (0-1)	do	4.5	50	40	75	90
II	Diesel oil	Spray + Drench			20	90

The results in Plots IA (0-1), (1-2), (2-3), and IB (2-3) were excellent. Only two bushes with two feet of live stem remained alive in this area. No seedlings were found. The area was entirely free from herbaceous vegetation. The results in Plots IB (0-1) and (1-2) were less satisfactory. The Ribes density in these plots was not uniform. The western portion of the plots was covered with a dense mat of leafy stems. In the eastern half of the plots the bushes were scattering. Good kill was obtained only in the parts of the plots where the Ribes were dense and where, in spraying, considerable chemical had soaked into the ground around the crowns of the bushes.

In 1931 Diesel oil was applied to _R. erythrocarpum_ as a combined spray and surface drench. An area 15 feet by 33 feet entirely covered with _R. erythrocarpum_ was treated with 20 gallons of Diesel oil. The tops were thoroughly sprayed and the remainder of the oil was applied with a watering can as uniformly as possible over the soil. The area treated was under heavy coniferous shade. The ground was covered with needle litter to a depth of one-half inch.

Examination of the oil plot in 1933 showed that the oil had caused a reduction of over 90 percent in the original live stem. The bush kill was only about 10 to 20 percent. Regeneration in 1933 was very vigorous, bringing the present live stem to about one-quarter of the original figure.

D. PROGRESS STUDIES IN THE GROSS MORPHOLOGY OF RIBES STEM AND ROOT SYSTEMS

Introduction

Recent experience in field methods for the chemical destruction of Ribes has showed the advisability of applying chemicals to the soil to augment the earlier technic of spraying stems and leaves. Because of this proposed modification in field practice, it became highly desirable to know more about the distribution of subterranean parts of the plants. Work on the gross morphology of Ribes roots in relation to species, extent of stem systems, variations of habitat, etc., was started in the summer of 1932 after the completion of work on the Swauk Creek series of experimental chemical eradication plots. A report on this 1932 field work (plot locations, Orogrande Creek, Clearwater National Forest, and the vicinity of Clarkia, St. Joe National Forest) was submitted on March 23, 1933; this report may be consulted for complete data. A short article in the Western Blister Rust News Letter, Vol. 8 (1933), No. 6 (August) pp. 51-52 briefly describes the 1932 and some of the 1933 work on _R. inerme_.

During the field season of 1933, the work was continued with a revised method of recording data, which made it possible to compute directly the percentage distribution of "feeder" roots by soil-depth layers. The field work was tedious, but the results are interesting and of no small importance.

In addition to the report of a year ago and to the material now presented, there is available a mass of data from a slightly less detailed study of many of the Swauk Creek plots, and of a small area on Tepee Creek, Coeur d'Alene National Forest, about 0.3 miles down Tepee Creek from the mouth of

Riley Creek. Finally, there remains unreported a considerable amount of the data collected in the 1932 work. None of these data are at variance with the more critical material now presented.

Description of Plots

The first three plots were located in the St. Maries River valley in the vicinity of the Clarkia Ranger Station, St. Joe National Forest, Idaho; the fourth was located on Swauk Creek, Wenatchee National Forest, Washington, about five miles southwest of Blewett Pass on highway U.S. 10.

Plot A. The first plot was chosen to represent the association of thick brush and Ribes of stream bottom type. It was located in bottom land along the St. Maries River about one mile northwest (downstream) from the Clarkia Ranger Station. The plot was situated on a flat brushy point of land bordered on three sides by a small, meandering river. In general, the area had practically no slope, but due to spring overflows and the activities of beavers, the ground was very uneven. The top soil was a clayey, silty loam having a high mica content. With depth, the soil became more and more sandy. There was little or no duff. The ground was progressively of more recent origin toward the outer part of the point.

There were few trees on the plot, but the brush was thick and tall; the whole area was a tangled thicket of hawthorn (Crataegus), alder (Alnus), two species of willows (Salix), creek dogwood (Cornus), low Rhamnus, black twinberry (Lonicera), and Ribes. Towards the point of the area the brush became slightly less high and less dense, and contained a larger proportion of willows. The herbaceous perennials were about as thick as the dense growth of brushy species would permit. Annuals were by no means absent, but were relatively unimportant.

Ribes bushes were plentiful. There were large numbers of long, thin, nearly leafless stems of R. inerme intermingled with the tangle of vegetation. Viewed from above the blanket of vegetation, R. inerme did not seem particularly abundant; closer inspection, however, showed the presence of many plants. R. petiolare grew more gregariously and somewhat less abundantly than R. inerme. On the older part of the plot a few plants of R. lacustre grew in clumps of conifers and arborescent brush. Bushes A-1, A-2, and A-3 (R. inerme) and bush A-6 (R. petiolare) were situated near the point, while A-4 and A-5 (R. petiolare) grew a few rods farther back (westerly) near a clump of spruce trees on the downstream (northerly) margin of the plot.

Plot B. The second plot was about half a mile northwest from the Clarkia Ranger Station and was immediately north of the old pole yard. It was situated on a relatively level, dry, and open lodgepole-pine area, which sloped gently toward the river from the edge of the hills. Few trees of the original stand of timber were left, but many relatively young lodgepole pines grew on the plot.

Only a small amount of brush occurred on the area. Some species, willow, cottonwood (Populus), black twinberry, cascara (Rhamnus), and service

berry (Amelanchier), formed small, isolated clumps. Waxberry (Symphoricarpos), sometimes mixed with false box (Pachystima), formed a very low, highly discontinuous ground cover. The predominating herbaceous perennials were strawberry (Fragaria), and a low grass. The occurrence of such plants as wild ginger (Asarum) and yerba buena (Micromeria) indicated that the area had once been much more heavily timbered.

Bush B-1 grew in a shady, relatively clear space in a clump of lodgepole pines. Bush B-2 occurred in the open in a thick stand of low brush and herbs. Practically no tree shade was cast upon the location. Bush B-3 was shaded rather completely during the hottest part of the day by low lodgepole pines. Perennial grass, waxberry, and black twinberry were abundant near this bush.

Plot C. Plot C. was located about one-fourth mile north of the Clarkia Railroad Station, between the railroad and the St. Maries River. Although nearly surrounded by high brush, the area itself was not brushy, but grassy. Although the plot was meadow-like, there were scattered clumps of low brush upon it. The most abundant shrubs were waxberry, black twinberry, low Rhamus and willow.

The grass was short except in clumps of brush. The sod was thick and heavy. The plot was in an area grazed by a few cows, but the R. inerme bushes were not browsed. The sun exposure was practically total until the late afternoon when the area was included in the shadow cast by the steep hill to the west.

Bush C-1 was upright and stocky, a typical "sun-form" bush, and grew in open grassland with no associated brush. Bush C-2 grew nearer the border of the grassy area and was intertwined with a Lonicera bush of about equal height and size. The sod of sedge and grass roots was very dense. Bush C-3 was a stocky, upright, tall, vigorous plant which grew by itself in the grassland, which at that point was somewhat spotted with low clumps of R. inerme, Lonicera, Symphoricarpos, etc. The grass and sedge were relatively tall, and there were some associated perennial herbs, such as goldenrod (Solidago), aster, and yarrow (Achillea).

Plot D. Plot D was located on Swauk Creek at about 3,000 feet elevation, in the fenced enclosure of the 1932 experimental chemical Ribes eradication area. In its general features, this plot was similar to some of the plots used in the 1932 Swauk Creek chemical treatments. The area was on the creek bottom, and practically level. It was on the south side of the stream and was but a few rods from the steep, heavily timbered slope to the south; scattered clumps of alders 12 feet to 20 feet high occurred on the area. The ground was covered with a dense stand of waist high brush, mostly red Spiraea, waxberry, and R. inerme. A little Chrysothamnus, Solidago, and perennial grass were associated with the shrubby species.

The physiological condition of the brush was excellent and showed an abundance of soil water. The top soil was an adobe loam which by dessication

had shrunk and had been broken into small, irregularly shaped, pellet-like clods. Below the dry adobe loam the soil was silty, and moist.

Bush D-1, a relatively small plant, experienced intermittent shade from clumps of alders, and from the mature conifers on the contiguous hillside. Bush D-2 was located somewhat more in the open where the brush was lower and less luxuriant. Bush D-3 was a tall, "shade-form" plant growing in dense, shoulder high brush nearer the timbered slope to the south. Several alders were growing a few feet to the south and southwest of this bush.

Methods

General. The plots upon which bushes were excavated, were selected with the one intention that they should be representative of types of habitat in which bushes of *R. inerme* most frequently occur. One plot was chosen in the dense, tall brush of more or less typical Idaho stream bottom. Another plot was picked out on deep, fairly dry, and fairly homogenous soil on a timbered flat away from all streams. A third, and intermediate plot, was selected in the grassland that sometimes occurs in valleys near streams. A study of a fourth plot, in the 1932 Swauk Creek chemical plots enclosure, was made so that comparison and correlation of the bush habits on the Swauk Creek plots could be made with other areas. A comparison of rooting habits of *R. inerme* and *R. petiolare* was made on the dense brush plot. On the other areas, only *R. inerme* was studied.

The plots were selected to represent a combination of ecological factors, and were of no standard size. They were not staked. It would be obviously impossible to select any area in a stream valley in mountainous country over which no variation in ecological factors occurred, but it is believed that the plots on which root work was done represented certain well-defined types of environment.

After the plot had been located it was carefully inspected. Plants that were considered suitable to represent the area in the root work program were selected and marked. Detailed notes were made on many of the more obvious environmental factors.

Bush records. The work on an individual bush proceeded as follows: notes were taken on the conditions immediately surrounding the bush as they seemed to vary from the recorded data for the plot. The direction of the axis of the plant profile graph was decided upon, recorded, and plainly marked with stakes. One stake was always set at the center of the crown. The stems were carefully untangled from the rest of the vegetation and a space of ample proportions was cleared about the bush. The ground plan of the stem system was diagrammed to scale. The height of each stem tip was recorded. The stems were cut off, measured, and recorded. Lengths of dead stem, C.S.S. (current season stem), live stem older than C.S.S., and layering stem were kept separate on the recorded sheet. Contour of the ground surface was marked by a number of stakes driven over the area covered by the root system. The ground was never level and these stakes were necessary to determine the depth of the roots. The buried stem, if any, and the roots, were carefully excavated and recorded by

depth layers, and by distance from the center or crown stake along the previously selected axis of the plant.

The root units recorded were estimations of actual lengths of the smallest roots encountered. The theory entertained was that the distribution of these fine roots would be the same as the distribution of the plants absorbing surface in the soil. Each root unit was represented on the data sheets by a dot. For R. inerme, each dot was considered to represent six inches of the finest roots, and for R. petiolare, 12 inches. There was no great concern if the value of these units varied from one bush to another, but great care was exercised to make the units recorded for any one bush as strictly comparable as possible. It is felt that the error introduced by computing percentage of absorbing surface by depth layers, from the recorded dots, is small and relatively constant. No attempt was made to translate the field data into root length per foot of live stem. Such an interpretation would be subject to considerable error.

In the complex tangles of roots encountered in the excavation of some plants, it was found practically impossible to extricate all of the fine roots without some breakage and loss which had to be accounted for by subsequent estimation. The Ribes roots were fairly characteristic as to color, covering, type of branching, and amount of ramification, and the small amount of estimation necessary introduced no major error.

Soil profiles. The soil profile data were obtained by direct measurement of the soil in a hole dug to a depth just below that of the deepest root. The measurements were made after complete removal of the bush. The hole was usually dug immediately beneath the location of the corwn of the bush.

The terms concerned with size of soil particles used in soil profile notes and reports were given in the following series: rocks, gravel, sand, silt, and clay. The descriptive terms used for the condition of organic matter in the soil were: litter and debris, duff, decomposed duff, duffy loam, and loam. The apparent degree of aeration of the soil was estimated and described in the following terms: excellent, good, fair, poor, and very poor. The direct measurement of the amount of air in the various strata of soil was planned, but the comtemplated method of taking samples proved to be impractical. The amount of water in the different soil layers was described by one of the following terms: muddy, wet, moist, dry, and dessicated.

Presentation of summarized data. Table No. 16 gives certain important items of the data collected for each of the several bushes. The data are presented, in general, in numbers of two significant figures.

Table No. 17 concerns plot averages only, and lists the many items of data which were recorded. The figures were obtained by averaging the values for the three individual plants in each of the five groups. It should be noted that the data for R. petiolare were derived from Plot A only. A comparison of the data for R. petiolare (Plot A) with those for R. inerme of Plots B, C, and D would be very inaccurate on account of habitat differences.

The figures of Plates 1, 2 and 3 present the vertical profiles of the excavated bushes. No data were recorded for the stem system of A-2 (R. inerme). The orientation of the main axis of the plant graph is in each case indicated by a compass direction. To date this datum has not appeared to have any particular significance. On each plant profile the center of the crown is indicated by an "X". It should be kept in mind that the graphs do not indicate root density in the various layers. The percentage distribution of roots by depth layers is one of the items recorded in Table No. 17.

The depth distribution of roots is presented graphically by plot averages in Plate 4. Plates 5, 6 and 7 describe the soil conditions under each of the several plants. The soil data were obtained by visual inspection.

Discussion

The data have been presented with moderate fullness in the tables and plates. This portion of the report will be of value mainly to call attention to certain points worthy of emphasis.

The conditions on Plot A undoubtedly represented the most typical habitat for R. inerme. It will be observed that on this plot, the bushes which were chosen to represent average plants had more live stem, a much higher annual growth rate, and a much shallower root system than on the other plots. The three R. inerme bushes of Plot A had on them, at the time of study (the middle of July), a total of 133 feet of current season stem and one bush (A-2) had 73 feet. This very rapid growth rate of mature bushes of R. inerme in favorable circumstances makes the species particularly important in the program of blister rust control. On the same plot the three bushes had 88 percent of their "feeder" roots in the first six inches of soil. Only two percent of the roots were below one foot. This would certainly favor the destruction of the plants by chemicals, if any attention were given to the application of the chemical to the ground under the duff and directly over the roots.

The amount of ground area covered by the stem system and the root system of an R. inerme bush may or may not be approximately the same. In many cases also, the stems are by no means directly over the roots. This creates a condition which is bound to increase the difficulties of practical Ribes eradication work. The absence of roots under shoots, and of shoots over roots, appears most marked in the brushy locations where the use of chemicals is most urgently needed. The direction of water currents during spring freshets appears to be the most important factor in determining this lack of correspondence between roots and stems.

In general, the stream bottom soils are relatively porous. Any chemical applied in solution should penetrate quite readily provided that the solution was applied so that the duff and debris would not stop it. With 75 or more percent of the roots of a plant in the first six inches of soil, it would seem plausible to strike at the roots. Roots can live for relatively long periods without stems, but the life of a stem without absorbing organs is very short.

PLATE I.   DIAGRAMS OF PROFILES OF RIBES BUSHES

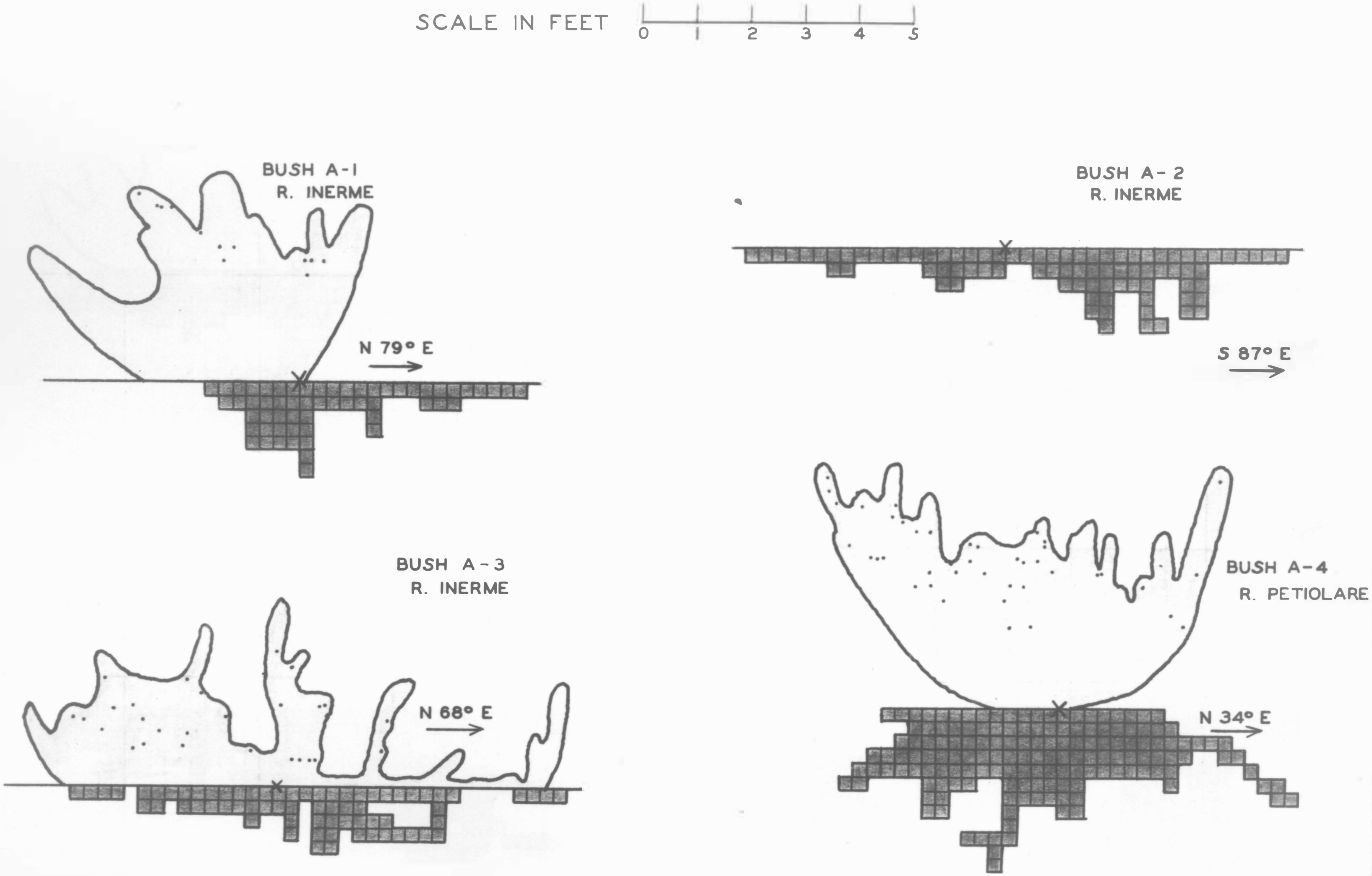

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PLATE 2. DIAGRAMS OF PROFILES OF RIBES BUSHES

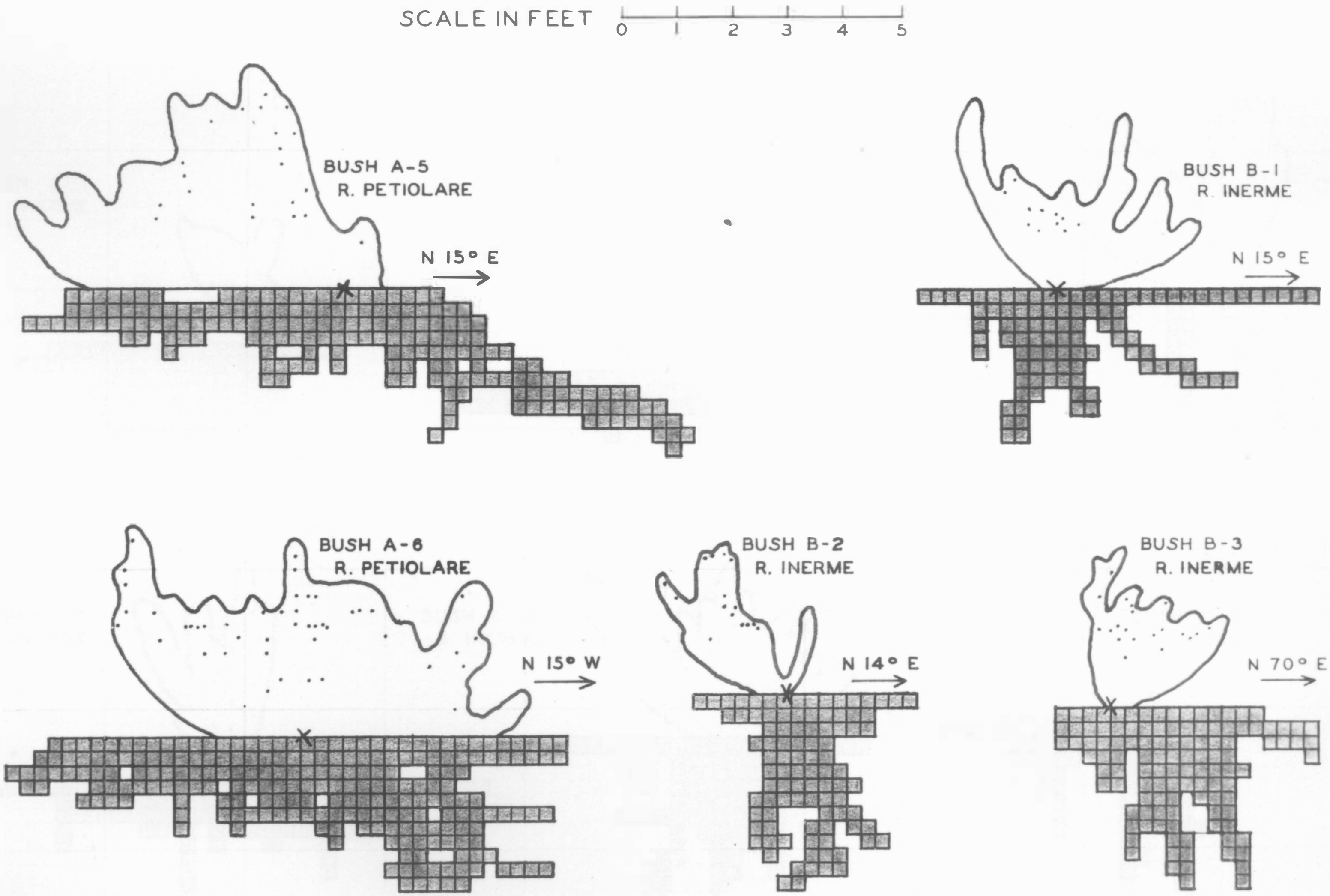

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PLATE 3. DIAGRAMS OF PROFILES OF RIBES BUSHES

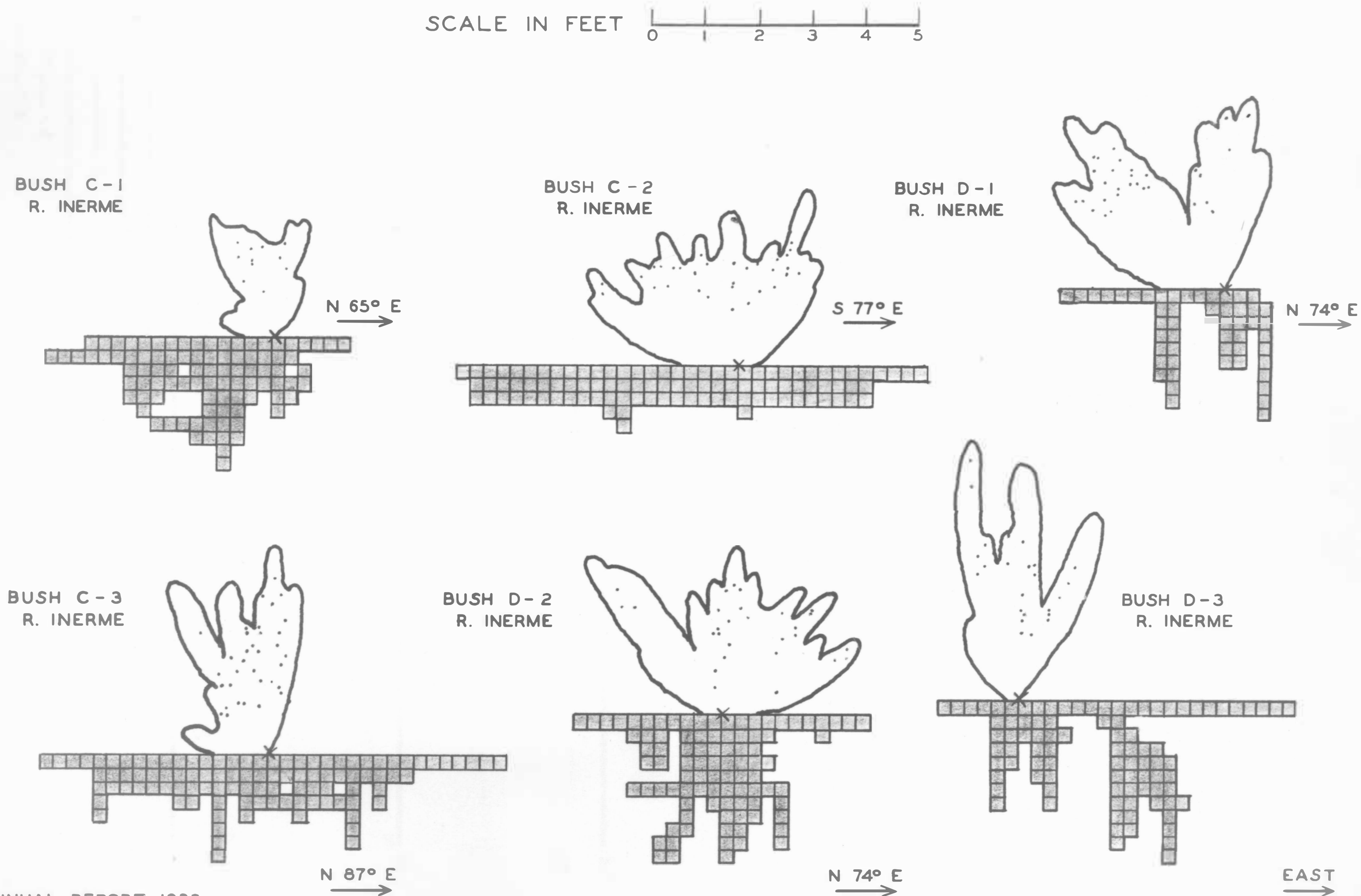

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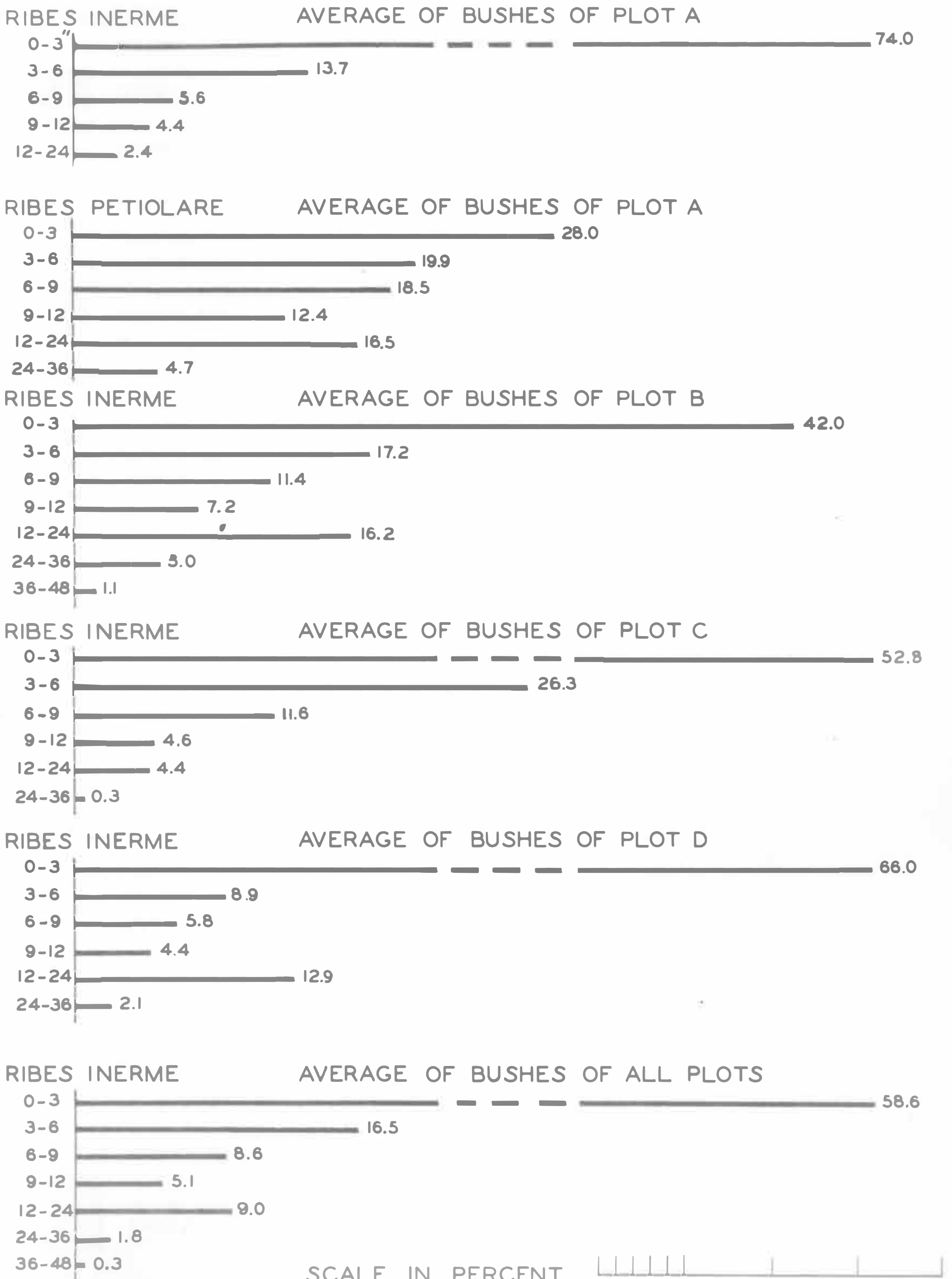
PLATE 4.

PERCENTAGE DISTRIBUTION OF ROOTS BY DEPTH LAYERS



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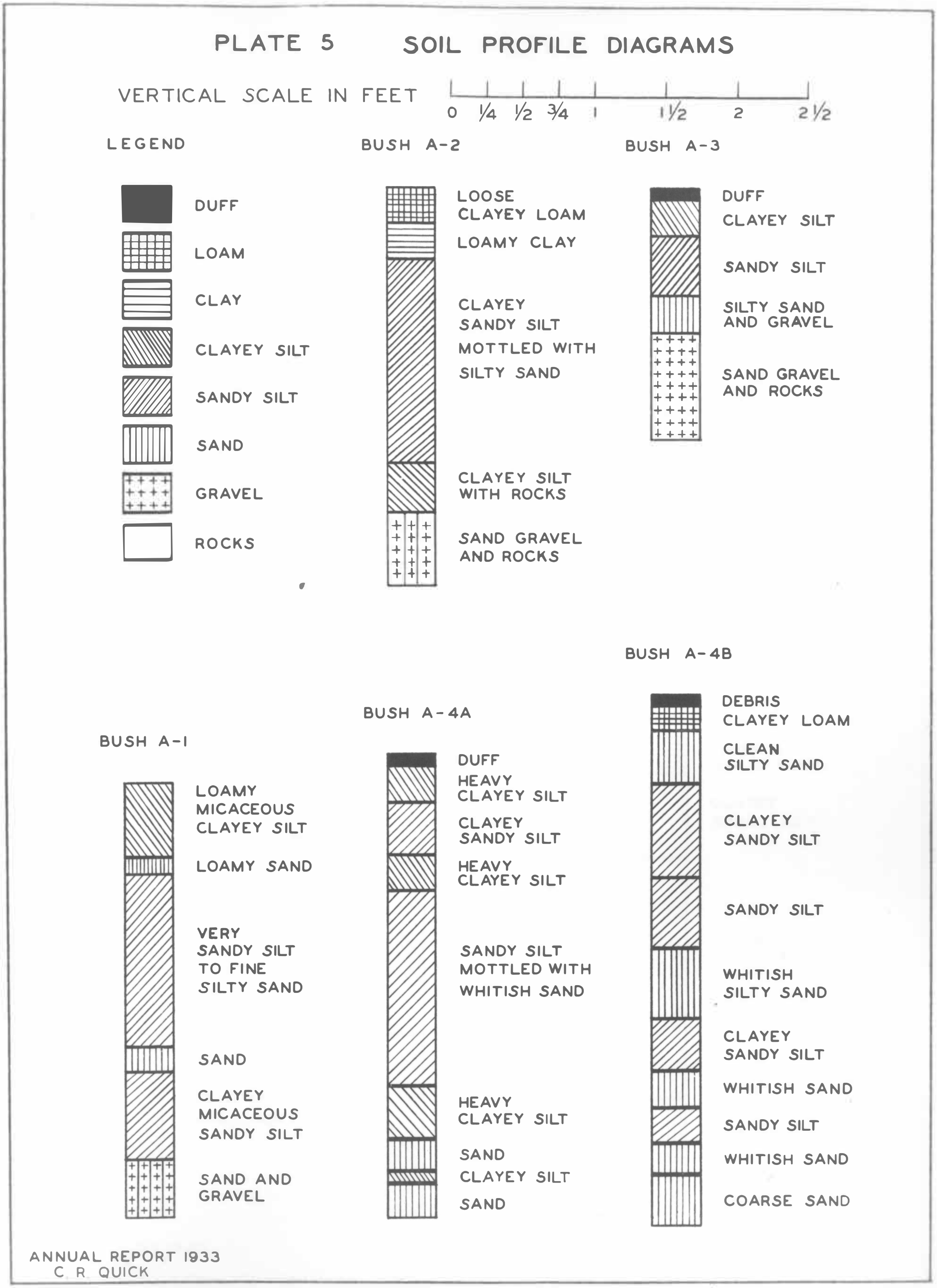
PLATE 5
SOIL PROFILE DIAGRAMS
VERTICAL SCALE IN FEET
0
1/4
1/2
3/4
1
1 1/2
2
2 1/2
LEGEND
DUFF
LOAM
CLAY
CLAYEY SILT
SANDY SILT
SAND
GRAVEL
ROCKS
BUSH A-2
LOOSE CLAYEY LOAM
LOAMY CLAY
CLAYEY SANDY SILT MOTTLED WITH SILTY SAND
CLAYEY SILT WITH ROCKS
SAND GRAVEL AND ROCKS
BUSH A-3
DUFF
CLAYEY SILT
SANDY SILT
SILTY SAND AND GRAVEL
SAND GRAVEL AND ROCKS
BUSH A-1
LOAMY MICACEOUS CLAYEY SILT
LOAMY SAND
VERY SANDY SILT TO FINE SILTY SAND
SAND
CLAYEY MICACEOUS SANDY SILT
SAND AND GRAVEL
BUSH A-4A
DUFF
HEAVY CLAYEY SILT
CLAYEY SANDY SILT
HEAVY CLAYEY SILT
SANDY SILT MOTTLED WITH WHITISH SAND
HEAVY CLAYEY SILT
SAND
CLAYEY SILT
SAND
BUSH A-4B
DEBRIS
CLAYEY LOAM
CLEAN SILTY SAND
CLAYEY SANDY SILT
SANDY SILT
WHITISH SILTY SAND
CLAYEY SANDY SILT
WHITISH SAND
SANDY SILT
WHITISH SAND
COARSE SAND
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PLATE 6 SOIL PROFILE DIAGRAMS

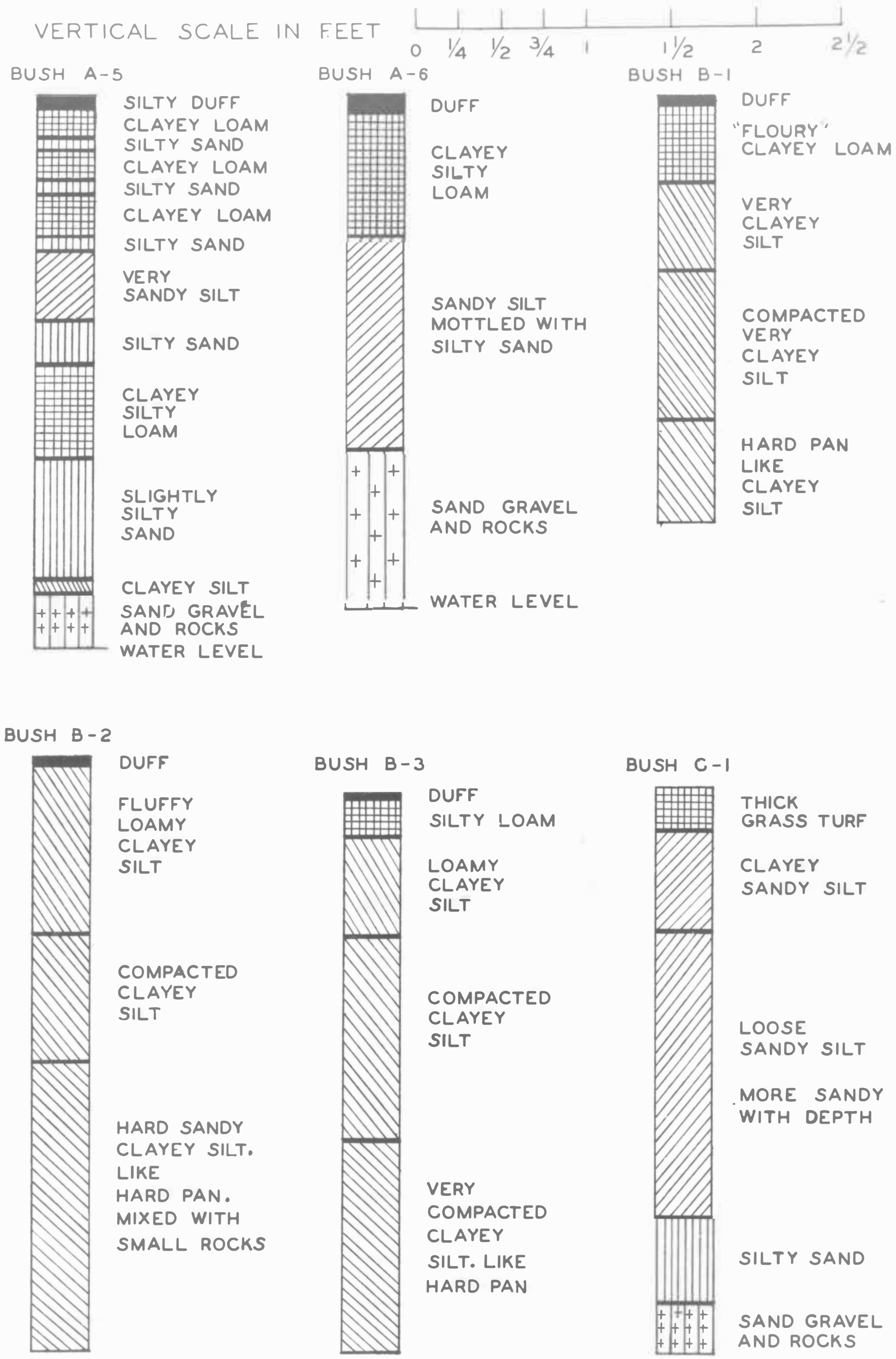

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PLATE 7 SOIL PROFILE DIAGRAMS

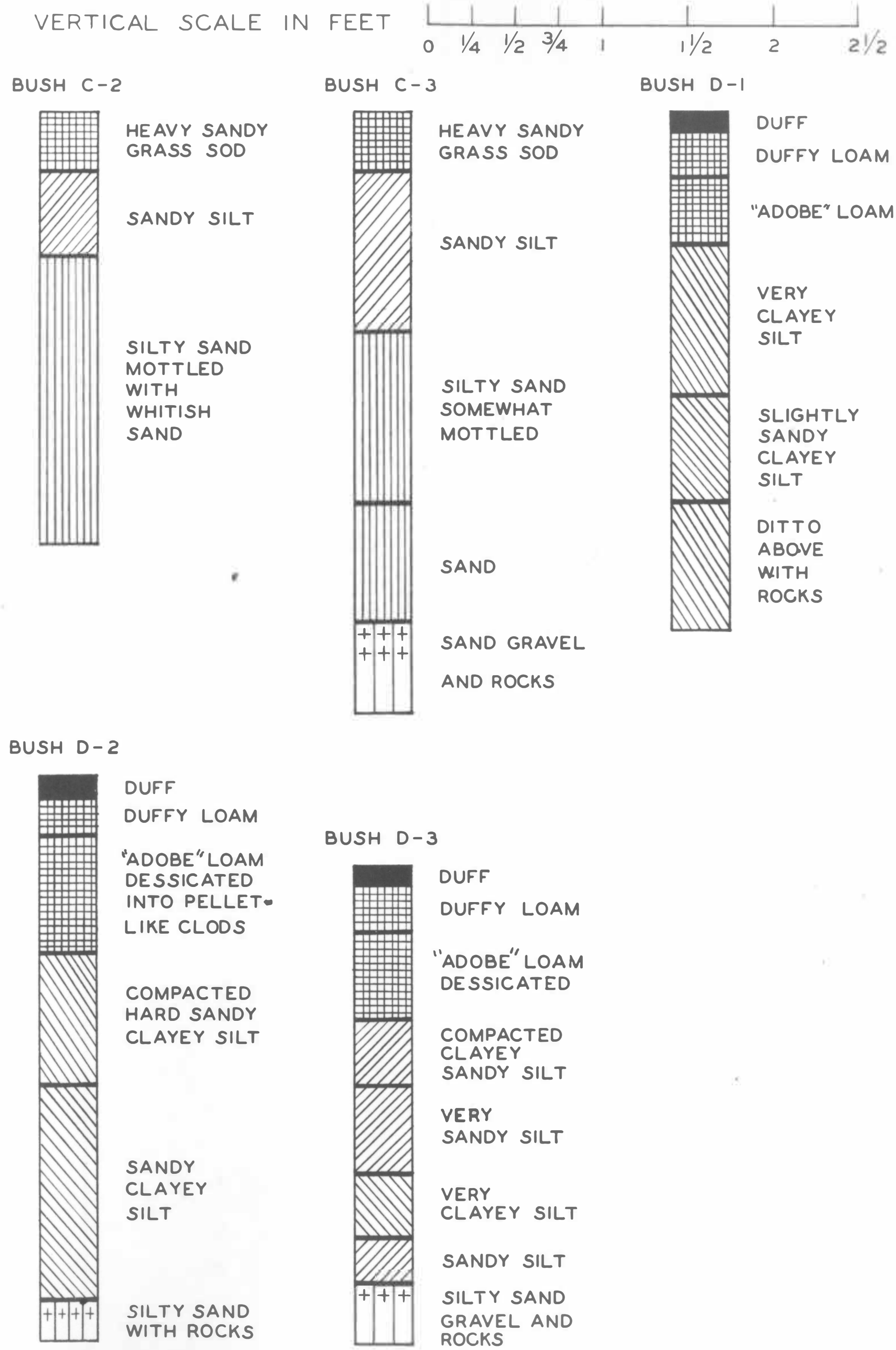

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TABLE NO. 16

SELECTED ITEMS OF DATA FOR THE FIFTEEN INDIVIDUAL BUSHES

Serial No. of Excavated Bush	Species of Bush	Age of Bush in Years	Live Stem of Bush Length in Feet	Average Feet of LiveStem Per Year of Age	C.S.S. Ratio Percent of Current Season Stem to Total Live Stem of Bush	Diameter of Root System in inches First Three Inches of Soil	Average Depth of Plotted Root Points Inches below Surface	Percent of Plotted Root Points in First Six Inches of Soil	Percent of Plotted Root Points Below 24 Inches of Soil
A-1	R. inerme	5	53	11	45	70	3.5	83	0.0
A-2	do	8	275	34	26	120	2.8	89	0.0
A-3	do	8	114	14	32	70	2.6	91	0.0
A-4	R. petiolare	7	126	18	41	65	7.2	47	1.1
A-5	do	10	95	10	23	80	8.9	45	8.2
A-6	do	12	115	10	40	110	8.2	52	4.7
B-1	R. inerme	7	37	5	22	85	5.8	68	2.1
B-2	do	7	28	4	44	50	8.8	57	9.6
B-3	do	6	38	6	42	45	8.4	52	6.5
C-1	R. inerme	5	42	8	60	60	4.8	75	1.0
C-2	do	8	72	9	38	110	3.6	80	0.0
C-3	do	6	48	8	45	110	4.1	82	0.0
D-1	R. inerme	7	50	6	59	45	3.9	83	1.3
D-2	do	9	56	6	36	65	5.5	70	2.3
D-3	do	8	38	5	36	80	5.7	72	2.6

TABLE NO. 17

SUMMARY OF DATA BY PLOT AVERAGES

		Plots and Species				
		Ribes petiolare	Ribes inerme			
		A	A	B	C	D
Age of bushes in years.		10	7	7	6	8
Number of main stems from crown.		9	4	7	11	7
C. S. S. (Current Season Stem or Stems.)	Number of current season shoots over one inch.	55	75	26	55	34
	Average length of current season stems, inches.	8.6	7.7	7.9	58	7.4
	Longest current season stem, inches.	24	25	22	22	27
	Total length of current season stems, feet.	40	44	12	25	21
C. S. S. Ratio. Length of current season stem divided by total length of live stem of bushes.		35	35	36	47	44
Feet of live stem older than current season stem.		72	103	22	29	27
Total feet of live stem, current season stem and older.		112	148	34	54	48
Growth rate. Average feet of live stem per year of age.		12	20	5	8	6
Estimated feet of dead stem on bush.		43	37	17	33	18
Number of fruiting spurs on bush.		32	283	116	36	54
Highest stem tip of bush, inches.		48	43	36	39	47
Roots	Deepest root found below soil surface, inches.	35	18	38	23	33
	Average depth of plotted root points recorded in inches below surface.	8.1	3.0	7.7	42	5.0
	Horizontal spread. Diameter of root system in first three inches of soil.	85	88	60	90	64
Concerning the depth distribution of roots. Percentages of plotted root points occurring in the horizontal depth layers as given.	0 to 3 inches	28	74	42	53	66
	3 to 6 inches	20	14	17	26	9
	6 to 9 inches	19	6	11	12	6
	9 to 12 inches	12	4	7	5	4
	12 to 24 inches	17	2	16	4	13
	24 to 36 inches	5	0	5	0	2
	36 to 48 inches	0	0	1	0	0
As above. Percent of roots in first six inches of soil.		48	88	59	79	75

The only comparison possible between R. inerme and R. petiolare is on Plot A. Here it would seem that in general R. petiolare grows more in gregarious clumps, that it roots more deeply, that its growth rate in feet of live stem per year is lower, and that a much smaller percentage of roots are in the first six inches of soil. The comparison is weakened by the fact that it is based on data from a single plot.

On the drier plots the average depth of roots of R. inerme was more than on Plot A, the stem systems were more compact and upright, the soil was more uniform (less stratified), and the growth rates were lower. In a number of cases the widespread lateral distribution of the roots in the first three inches of soil was of particular interest. The average area of soil surface equivalent to the lateral root distribution markedly exceeded the average area covered by the stem system.

It is believed that the general characteristics of the root systems of R. inerme have been determined by this study. The suggestion is advanced, however, that a statistical approach to this problem will be necessary before the data can be effectively used in chemical work by the Ribes eradication crews. A crew of several men would be needed to make an adequate extension of such studies in the field. Definite recommendations for the work may be made after summarization of data from the 1933 Clarkia tests.

E. RECOMMENDATIONS FOR THE USE OF CHEMICALS IN RIBES ERADICATION

Idaho.

(a) Areas containing *R. petiolare* as the Ribes population should be given a combined aerial spray and soil drench with 5 lb. rod/5 gal.* sodium chlorate or with 7 lb. rod/5 gal. Atlacide.

(b) Areas containing *R. petiolare* and *R. inerme* growing in intimate association should be given an aerial spray and soil drench with 10 lb. rod/5 gal. ammonium thiocyanate followed about a year later with 30 lb. rod/10 gal. ammonium thiocyanate.

(c) Areas containing *R. inerme* and *R. lacustre* in intimate association or either species alone should be treated as recommended for (b) *R. petiolare* and *R. inerme*.

(d) Single bushes of *R. viscosissimum* or *R. irriguum* which are too large to be hand pulled or too difficult to eradicate because of growth habitat, should be decapitated at or below the point at which the aerial stems branch from the crown. After these mutilated crowns have been wet with a little water they should be treated with three to four ounces of sodium fluoride or finely ground copper sulphate.

Oregon.

No additional work has been done in Oregon during the 1933 season. The status of recommendations, therefore, remains unchanged from that given in the 1932 report. The results of 1933 experiments on *R. cereum* in California and Washington, to be determined in the spring of 1934, may permit of recommendations for chemical work on *R. cereum* in southern Oregon.

California.

(a) Areas of *R. inerme* in northern California should be handled as advised under *R. inerme* areas for Idaho.

(b) Single bushes of *R. roezli* or *R. nevadense* which cannot be readily grubbed out, should be treated according to the recommendations for *R. viscosissimum* and *R. irriguum* in Idaho.

(c) The results of 1933 tests on *R. roezli* and *R. cereum* may allow for additional recommendations on the use of Diesel oil or ammonium thiocyanate for the destruction of these species. Until these data are available, recommendations for field work on these species remain substantially as given in the 1932 report.

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*In all future recommendations made by the chemical investigations unit, this dosage designation will be used. The relationship between weight of chemical and volume is expressed as weight per volume of solution; thus, a 5 lb. rod/5 gal. treatment means five pounds of chemical in five gallons of solution evenly distributed over one square rod.

F. PROPOSED LABORATORY AND GREENHOUSE WORK SEPTEMBER 1933 ET SEQUITUR

1. Determination of the specifications on ammonium thiocyanate for use in Ribes eradication. (Completed October 1933, Research Report Serial No. 53).

2. Study of the corrosiveness of ammonium thiocyanate to several metals suitable for tank construction. (Completed October 1933, Research Report Serial No. 51.)

3. Determination of the downward movement, if any, of ammonium thiocyanate when the leaves and part of the aerial stem are treated for definite periods of time with solutions of known concentration.

4. Investigation of the velocity of reaction of the decomposition of sodium chlorate in acid medium with and without chloride ion; and study of the capacity for the decomposition of sodium chlorate exhibited by freshly expressed Ribes sap.

5. Measurement of the leaf area of Ribes leaves (collected in 1933 by Quick) by means of a chemical method. The procedure to be tested involves the exposure of photographic paper to light after placing the leaves on the surfaces of the paper in a suitable frame. Titration of the metallic silver should give a factor showing the area of leaf surface equivalent to the reduced silver salt.

6. Study of the mechanism of toxicity of ammonium thiocyanate to plant protoplasm by determining the effect of NH_4SCN, $(NH_4)_2SO_4$, KSCN and K_2SO_4 on protoplasmic streaming, coagulation of protoplast and exosmosis of the chloride from vacuolar sap.

PROGRESS REPORT OF STUDIES IN EFFECTIVENESS OF CONTROL
1933

By
E. L. Joy,
Junior Forester

INTRODUCTION

Application of the present Ribes eradication methods results in the removal of most of the Ribes from areas during the first working and consequently affords a degree of protection to the adjacent white pines. This protection, however, although due to the removal of Ribes, must be measured in terms of the quantities of Ribes remaining and developing after eradication.

With this in mind, two types of studies are being conducted to determine the effectiveness of control. They are, (1) a study of the growth and regeneration of Ribes following Ribes eradication and (2) a study of the effect of known amounts of Ribes per acre in spreading and intensifying blister rust.

For the growth and regeneration of Ribes study, which has been carried on in stream type only, 247 plots located in 14 drainages were established in 1929, 1930 and 1931. Of this total, 178 containing 6,526 acres have been selected for this study.

The effect of known amounts of Ribes per acre, in spreading and intensifying blister rust, has been studied by surveys of pine infection centers. White pine plantations established in 1931 on pine infection areas from which the Ribes had been eradicated, will yield additional data on this point.

The progress of the work of this project is given under the following titles: The Growth and Regeneration of Ribes in Stream Type Following Ribes Eradication, The Influence of Stream Type Ribes Eradication on Canker Intensification, and Pine Infection Studies, Newman Lake, Washington.

COSTS

Following is the statement of costs for this project:

Salaries....................	$4,743.41
Subsistence..................	613.79
Transportation..............	557.41*
Other.......................	7.14
Total.......................	$5,921.75

*Includes $319.60, total cost of truck No. 14.

THE GROWTH AND REGENERATION OF RIBES IN STREAM TYPE FOLLOWING RIBES ERADICATION

By
E. L. Joy
Junior Forester

PURPOSE

It is the purpose of this study to determine the effect of stream type Ribes eradication upon the Ribes population.

LOCATION OF WORK

Of the 14 drainages in which this study is being made, seven are located on the Potlatch and seven on the Clearwater Timber Protective Association lands in north Idaho. The drainages on the former are in the vicinity of the towns of Bovill and Elk River, while the latter are near Pierce and Headquarters. For convenience in this report these two divisions will be designated as the Potlatch and Clearwater Forest units.

DESCRIPTION OF PLOTS

In each of the 14 drainages under observation, permanent plots 20 chains apart were established at right angles to the stream flow. Each of these plots is .2 of a chain (13.2 feet) wide and as long as the stream type width at the point of plot location. For convenience of examination and computation of data, the plots are inspected and data recorded by milacre units which, as used, are 6.6-foot squares.

WORK DONE

Of the 178 plots selected for this study, 174 containing 6,464 acres were checked in 1933. These include 19 established in the Ruby Creek drainage in 1931 previous to a serious fire that prevented the scheduled initial Ribes eradication in that year. Since this drainage was included in the 1933 Ribes eradication program, the plots were rechecked before this first working. These plots will not yield results for this study until 1934.

RESULTS

Due to the fact that the 14 drainages in which the plots are established are located in both the Potlatch and Clearwater regions, the stream type areas and therefore the plots have not all received identical Ribes eradication treatment. Thus we have Ribes data from plots that fall into 11 distinct classifications as follows:

Initial Ribes Eradication	Second Ribes Eradication	Third Ribes Eradication
Immediately before	Immediately after	Immediately after
Immediately after	One year after	One year after
One year after	Two years after	
Two years after		
Three years after		
Four years after		

Table No. 1 shows for each drainage the amount of Ribes-old-growth and seedling live stem per acre before and at various intervals after Ribes eradications. These data are presented graphically in Graphs No. 1 and No. 2.

TABLE NO. 1

TOTAL FEET OF LIVE STEM PER ACRE OF ALL RIBES SPECIES BEFORE AND AFTER RIBES ERADICATION

Potlatch Forest Unit

Area Status	Feet of Ribes Live Stem Per Acre						
	E. Fk. of Potlatch Creek	Mallory Creek	Deep Creek	Johnson Creek	Cameron Creek	Shattuck Creek	Ruby Creek
Imm. before 1st erad.	113,649	59,524	25,804	39,560	41,266	66,651	(2) 12,741
Imm. after 1st erad.		792	496	1,849	2,441	3,692	
1 yr. after 1st erad.	751	996	810	2,189	3,388	8,405	
2 yrs. after 1st erad.	734	1,245	(1) 627				
3 yrs. after 1st erad.	851	902	895				
4 yrs. after 1st erad.	894	1,603	(1) 578				
1 yr. after 2nd erad.				963	649	1,142	
2 yrs. after 2nd erad.				1,616	754	1,218	

Clearwater Forest Unit

Area Status	Deer Creek	N.Fk.of S.Fk. of Reed's Creek	S. Fk of Reed's Creek	N. Fk. of Reed's Creek	Alder Creek	Loop Creek	Oro-fino Creek
Imm. before 1st erad.	49,638	66,098	43,798	38,290	20,040	43,375	12,064
Imm. after 1st erad.	202	185	139		1,418	858	
1 yr. after 1st erad.	600	812	350	1,281	2,118	1,492	175
2 yrs. after 1st erad.	(3) 318	1,777	993	2,333	3,287	2,348	594
1 yr. after 2nd erad.	134	96	127	(4) 564	(4) 991		
2 yrs. after 2nd erad.	340	241	424	(4) 860			
Imm. after 3d erad.						581	
1 yr. after 3d erad.					343	767	

(1) Reduction caused by grazing and logging.
(2) Although plots were established before fire in 1931, new basic data were taken immediately preceding initial Ribes eradication in 1933.
(3) Reduction caused by logging railroad construction.
(4) Partial third eradication before plots were checked.

In Table No. 1 and Graphs No. 1 and No. 2 it is seen that each working of an area resulted in a marked decrease in the Ribes live stem. A comparison of the Ribes reduction resulting from the first eradication with the reduction from the second is shown in Table No. 2.

TABLE NO. 2

AVERAGE FEET OF RIBES LIVE STEM PER ACRE IMMEDIATELY BEFORE AND AFTER THE FIRST AND SECOND RIBES ERADICATIONS AND THE PERCENT OF STEM REMOVED

	Av. Ft. Ribes Live Stem Per Acre				Percent Live Stem Reduction	
	First Eradication		Second Eradication		First	Second
Forest Unit	Before	After	Before	After	Eradication	Eradication
Potlatch	41,123	1,977	3,518	791	95.2	77.5
Clearwater	35,551	680	1,816	510	98.1	71.9
Both Units	38,338	1,372	2,428	621	96.4	74.4

It is notable in Table No. 2 that there was a 22 percent greater reduction of the large amount of original live stem during the first eradication than of the much smaller amount available during the second. This brings out the fact that after the removal of a high percentage of the large amount of original live stem, further reduction is accomplished at a much slower rate due to the decreasing size and more scattered location of the bushes.

Referring again to Table No. 1, it is seen that on all but two of the areas that were not disturbed between inspections, there was an increase in the amount of Ribes live stem. The two exceptions, East Fork of Potlatch and Mallory Creeks showed a decrease which cannot be explained. However, for statistical treatment, they can be considered as normal with the 28 cases in which an increase was recorded.

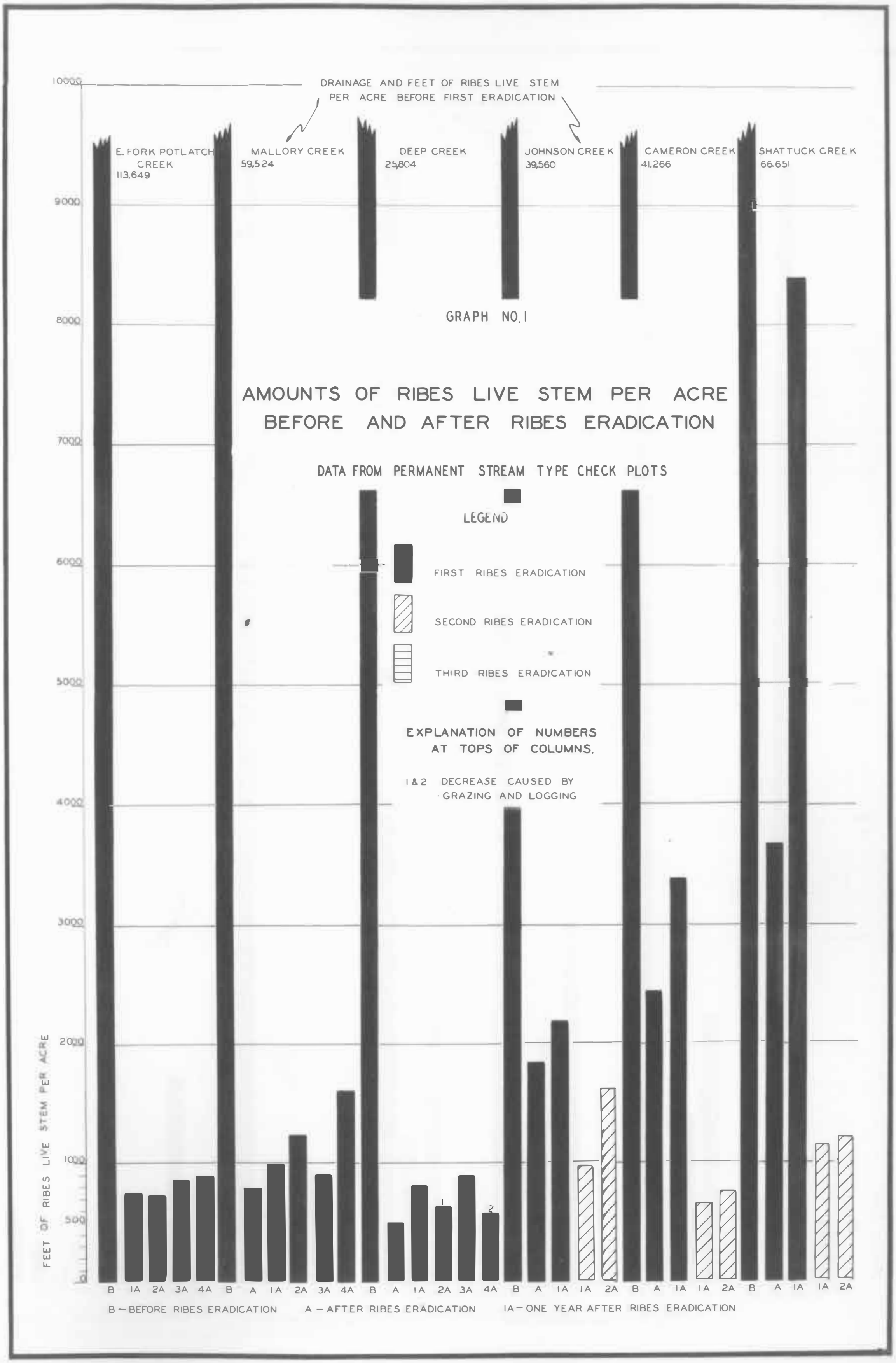
From the 30 sets of data representing annual growth of Ribes in 13 drainages for one to four years after Ribes eradication, the average annual increase in Ribes live stem has been computed. This increase rate is presented in Table No. 3.

TABLE NO. 3

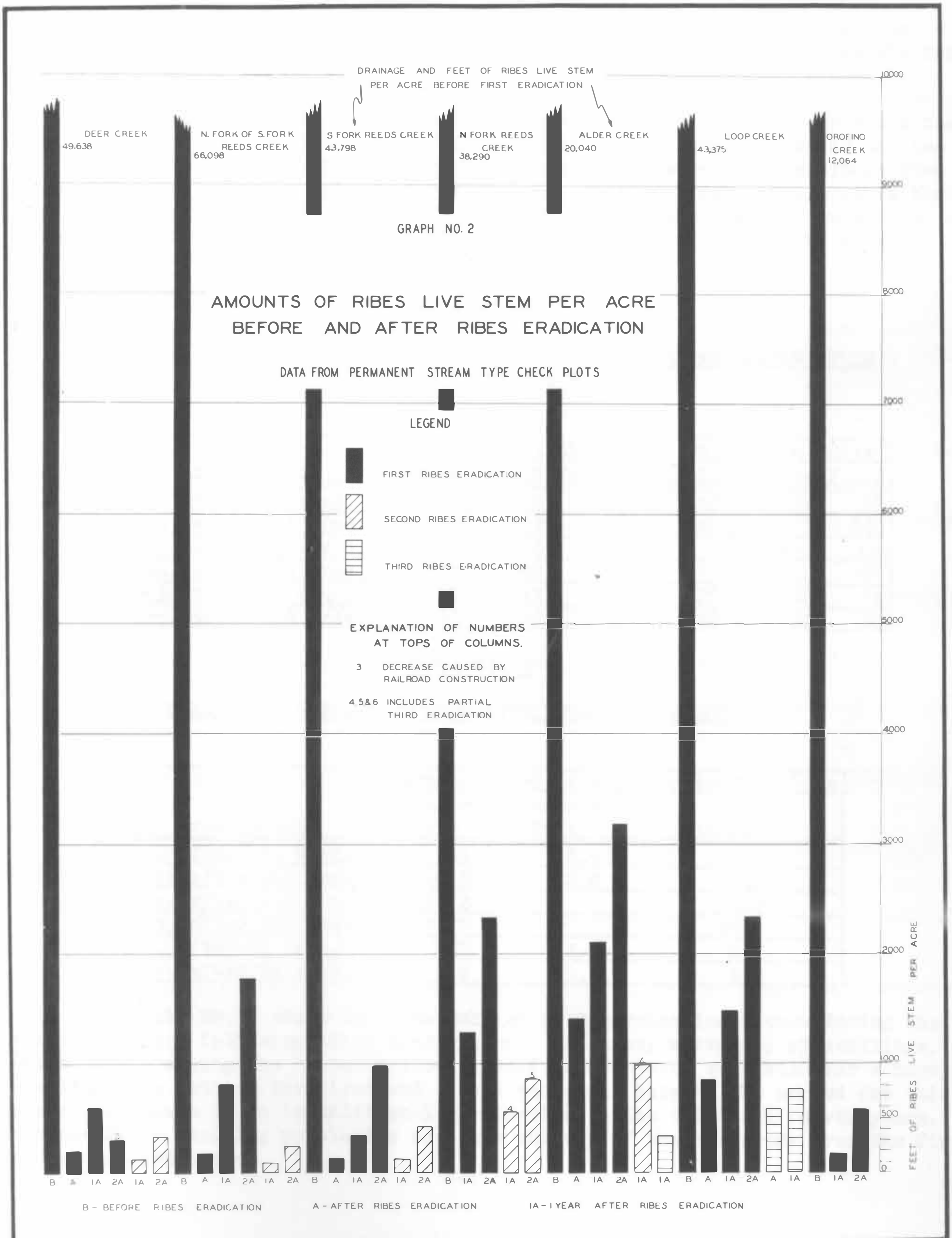
PERCENT ANNUAL INCREASE IN TOTAL RIBES LIVE STEM AFTER RIBES ERADICATION

	Percent Annual Increase		
Forest Unit	Minimum	Maximum	Average
Potlatch	-27.6	127.7	36.8
Clearwater	+32.0	338.9	76.0
Both Units	-27.6	338.9	51.3

It is important to note in Table No. 3 that the average annual Ribes live stem increment on the Clearwater areas is over 39 percent greater than on the Potlatch areas. Since the two occurrences of decreases in Ribes live stem were on Potlatch areas and are included in the average, it is evident that herein is explanation for part of this difference. However, since the average increase without these two areas is only 54 percent, it is apparent that there are other factors causing this real difference. From observational information only, it is the write



ANNUAL REPORT 1933
E L JOY



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E. L. JOY

opinion that a larger amount of moisture, better soil and greater protection from adjacent timber on the Clearwater areas are factors chiefly responsible for the greater annual growth there.

Throughout the preceding discussion total Ribes live stem only has been considered. Since the restocking of areas by Ribes seedlings is one of the important considerations in the problem of determining the most advantageous time to rework areas, data on this factor have been compiled. Table No. 4 gives the number and feet of live stem per acre of Ribes seedlings at various intervals after Ribes eradication, and Table No. 5 the percentage of total live stem attributable to seedlings.

TABLE NO. 4

NUMBER AND FEET OF LIVE STEM PER ACRE OF ALL RIBES SEEDLINGS AFTER RIBES ERADICATION

Area Status	Potlatch Unit		Clearwater Unit		Both Units	
	Number	F.L.S.	Number	F.L.S.	Number	F.L.S.
1 yr. after 1st erad.	848	75	493	52	637	61
2 yrs. after 1st erad.	1,030	104	955	280	972	240
3 yrs. after 1st erad.	442	205			442	205
4 yrs. after 1st erad.	510	259			510	259
1 yr. after 2nd erad.	61	18	31	15	40	16
2 yrs. after 2nd erad.	92	42	91	60	92	50

TABLE NO. 5

PERCENT OF TOTAL LIVE STEM ATTRIBUTABLE TO SEEDLINGS

Area Status	Percent Total Live Stem from Seedlings		
	Potlatch Unit	Clearwater Unit	Both Units
1 yr. after 1st erad.	2.8	5.4	3.7
2 yrs. after 1st erad.	10.3	12.3	12.0
3 yrs. after 1st erad.	23.3		23.3
4 yrs. after 1st erad.	24.8		24.8
1 yr. after 2d erad.	2.2	3.2	2.7
2 yrs. after 2d erad.	3.9	10.3	6.2

Table No. 4 shows that the bulk of seed germination occurs during the first two years following Ribes eradication. The heavy mortality of seedlings, which occurs during the winter following seed germination, accounted for a heavy seedling loss between the first and second and again between the second and third years. Although there is additional germination in the third and fourth years, the new Ribes seedling population consists chiefly of the survivors from the first and second year crops.

It is also seen in Table No. 4 that the live stem from seedlings becomes an important factor with the appearance of the first crop of seedlings and increases in importance each year thereafter. This is brought out quite clearly in Table No. 5 which shows that by the fourth year seedling live stem is approximately one-fourth of the total on the area.

Since the age at which Ribes seedlings produce seed is of great importance in determining the year of second eradication, careful observations have been made for flower or fruits on Ribes seedlings. Thus far none has been found even on 4-year-old plants.

SUMMARY

Of 247 plots established in 14 drainages on lands of the Potlatch and Clearwater Timber Protective Associations before initial Ribes eradication in 1929, 1930 and 1931, 178 have been selected for annual study. To date these plots show:

(1) Initial Ribes eradication reduced an average of 38,338 feet of Ribes live stem per acre to 1,372 feet which is a 96.4 percent reduction.

(2) Second eradication reduced an average of 2,428 feet to 621 feet which is a 74.4 percent reduction.

(3) In 28 out of 30 cases where there was no post-eradication disturbance, there was an annual increase in Ribes live stem following Ribes eradication.

(4) The average annual Ribes live stem increment is 51 percent.

(5) The bulk of seedling germination occurs during the first and second years after initial Ribes eradication.

(6) There is a heavy mortality of seedlings during the winter following their appearance.

(7) Seedling live stem becomes an important factor with the appearance of the first crop of seedlings.

(8) By the fourth year the seedling live stem constitutes approximately one-fourth of the total live stem of the areas.

(9) No flowers or fruits have been seen on Ribes seedlings that developed after eradication which includes 4-year-old plants.

THE INFLUENCE OF STREAM TYPE RIBES ERADICATION ON CANKER INTENSIFICATION

By
E. L. Joy
Junior Forester

PURPOSE

It is the ultimate purpose of this study to determine the effect of known amounts of Ribes per acre in spreading and intensifying blister rust. The immediate study, which is one step toward the ultimate goal, is concerned with the influence of stream type Ribes eradication on canker intensification.

PROCEDURE

Two methods of study are employed to obtain a measure of the influence of stream type Ribes eradication on canker intensification. Both methods, however, have the same prerequisite of a pine infection center, established prior to Ribes eradication, on each of the areas selected for study.

The first method is the determination of the proportion of cankers formed before and after stream type Ribes eradication, on the native pines within each infection area. The second is the determination of the number of cankers developing within plantations of white-pine nursery stock that was disease-free when planted immediately following stream type Ribes eradication. For studies by both methods, data were procured on the amounts of Ribes live stem on and adjacent to the infection and plantation areas.

RESULTS FROM STUDIES IN PINE INFECTION CENTERS

By the first method several pine infection centers that were caused by stream type Ribes before their removal in 1927, 1929, and 1930 were studied in 1933. In addition, studies were made at centers on unworked areas to give an index of the normal rate of disease intensification since the eradication years.

At each center canker tallies with a representation of all ages of cankers were made. From these tallies the number of cankers originating before and the number after Ribes eradication were determined. Table No. 1 shows the results from this study.

TABLE NO. 1

CANKER INTENSIFICATION RATE AT PINE INFECTION CENTERS AS DETERMINED IN 1933

Infection Center Location	Year of Ribes Eradication	Percent Trees Infected	No. Trees Studied	Feet of Ribes Live Stem Per Acre on Area					Number Cankers Originating			Percent Cankers Orig. After Erad. Year
				R.pet.	R.vis.	R.lac.	R. iner.	All Species	Before Eradication Year*	After Eradication Year*	Total	
Areas From Which Ribes Have Not Been Eradicated												
Snake Creek		16	59		302	771		1,073	22	2,035	2,057	98.9
Crystal Creek		60	42		6,025	1,646		7,671	116	700	816	85.8
Ruby Creek		25	11	9,430		3,040	271	12,741	16	157	173	90.8
Mazie Creek		5	25	3,000		500		3,500	12	56	68	82.4
N. Fk. Merry Creek		10	15	5,000		1,000		6,000	35	146	181	80.7
Little N. Fk. Coeur D'Alene River		70	10			848	7,045	7,893	32	55	87	63.2
Average												93.1
Areas From Which Ribes Have Been Eradicated												
Little N. Fk. Coeur d'Alene River	1927	70	10			312	1,088	1,400	146	32	178	18.0
N. Fk. Reed's Cr. 1-3/4 mi. below Headquarters	1929	21	9	502		358		860	4	36	40	90.0
N. Fk. Reed's Cr. 1/2 mi. below Headquarters	1929	20	13	502		358		860	12	8	20	40.0
S. Fk. Reed's Cr. 3/4 mi. below road	1929	20	11	110		47		157	14	145	159	91.2
Deer Creek (Main)	1929	10	13	** 136 # 92		** 210		438	18	19	37	51.4
Deer Cr.-Wn. Trail Fk.	1929	12	7	299		41		340	23	0	23	0
Johnson Creek	1930	4	6	307	28	229	1,052	1,616	9	0	9	0
Cameron Creek	1930	10	8	241		71	442	754	91	0	91	0
Average												43.1

*Assume 1929 as year of eradication, except Little No. Fork Coeur d'Alene River, which was 1927.

**Upland

Stream.

In Table No. 1 it is seen that on the areas where there has been no Ribes eradication the percentage of total cankers formed after the eradication years ranges from 63 to 99 while on the worked areas the range is from 0 to 91. The high percentages of cankers formed after Ribes eradication on the North Fork of Reed's Creek area, 1-3/4 miles below Headquarters, and the South Fork of Reed's Creek area 3/4 miles below the road, are explained by the close association of a few bushes of Ribes petiolare and not be large amounts of Ribes throughout the drainage. However, in the appraisal of the effectiveness of Ribes eradication on any area, this condition must be included as normal since it is of common occurance.

It is also notable that in general there appears to be no direct relationship between the amounts of Ribes live stem on these areas and the percentages of cankers formed after the eradication years; that is, the smallest amount of Ribes per acre caused the greatest percentage increase in cankers on both the unworked and worked areas. This lack of relationship is even more distorted on the Snake Creek area because we found that the 302 feet of R. viscosissimum has been responsible for several times the intensification caused by the 771 feet of R. lacustre.

These facts show us that when dealing with large amounts of Ribes we cannot point too critically at specific cases, but must look for differences through averages. Therefore, it is significant that for the unworked areas new cankers comprised 93 percent of the total and for the worked areas 43 percent. This 50 percent reduction resulted from the removal of Ribes live stem to a point where an average of not less than 100 nor more than 3,400 feet per acre was present during each year since eradication.

If the average of 8 areas with 100 to 3,400 feet of Ribes live stem per acre shows a 50 percent reduction in new cankers, what will be the result of Ribes removal to 25 feet per acre? The first impression is that Ribes eradication to this point will almost stop the rust which is true if we consider only the 25 feet. However, if the average annual Ribes live stem increase is 51 percent (determined from stream type check plots), the 25 feet compounds to over 100 feet in 4 years and over 1,000 feet in 9. Therefore, in order to capitalize on our initial eradicative efforts, it is imperative that we plan timely and adequate maintenance eradications to keep the Ribes population at a point where the pine losses will not be excessive.

RESULTS FROM STUDIES IN PINE PLANTATIONS

The pine plantations, established in 1931 as the second method of studying the influence of stream type Ribes eradication on canker intensification, were checked for the first time in 1933. These plantations of which there are six, beside those on and reported with data from the Newman Lake plot, are all within short distances of stream type and pine infection centers. Five were planted with about equal numbers of Pinus monticola and P. strobus while the sixth was planted with P. monticola only.

Due to about 2 weeks of hot weather immediately following planting, the mortality of pines was very high. Table No. 2 gives the pine and Ribes data for these plantations.

It will be noted in Table No. 2 that the survival of P. *monticola* was better than that of P. *strobus* in four of the five plantations and on the average for all plantations. However, the survival of both species in all plantations, an average of 12.6 percent, was extremely low as compared with the usual survival expectancy of 75 to 90 percent.

Since only two years had elapsed between the establishment of these plantations in 1931 and the examination of the pines surviving in 1933, no truly representative canker data were available. Only three infected trees with one incipient canker each were found. More indicative data will be forthcoming in 1934 and each succeeding year.

TABLE NO. 2

PINE AND RIBES DATA FROM PLANTATIONS ESTABLISHED IN 1931

Forest Unit	Plantation Location	P. monticola No. Planted	P. monticola Survival No.	P. monticola Survival Percent	P. strobus No. Planted	P. strobus Survival No.	P. strobus Survival Percent	Both No. Planted	Both Survival No.	Both Survival Percent	Total Ft. Ribes Live Stem* 1931	Total Ft. Ribes Live Stem* 1933
Potlatch	Cameron Cr.	770	50	6.5	770	16	2.1	1,540	66	4.3	29,957	0
Timber	Elk Cr.	836	171	20.5	836	116	13.9	1,672	287	17.2	2,435	0
Protective	Johnson Cr.	532	67	12.6	532	136	25.6	1,064	203	19.1	1,161	0
Association	All Areas	2,138	288	13.5	2,138	268	12.5	4,276	556	13.0	33,553	0
Clearwater	Quartz Cr.	1,322	82	6.2	1,311	36	2.7	2,633	118	4.5	1,450	0
Timber	Orofino Cr.	284	149	52.5	284	91	32.0	568	240	42.3	1,835	47.5
Protective	North Fork Reed's Cr.	778	123	15.8	0			778	123	15.8	227	35.5
Association	All Areas	2,384	354	14.8	1,595	127	8.0	3,979	481	12.1	3,512	83.0
Both Units	All Areas	4,522	642	14.2	3,733	395	10.6	8,255	1,037	12.6	37,065	83.0

*Taken on plantation area and adjacent strip approximately 1 chain wide. 1931 data were taken before first complete Ribes eradication.

PINE INFECTION STUDIES
NEWMAN LAKE, WASHINGTON

By
E. L. Joy
Junior Forester

INTRODUCTION

In the spring of 1928 pine infection, probably started in 1923 by *Ribes inerme*, was found near Newman Lake, Washington. Since only *R. inerme* and *R. lacustre* occurred in the vicinity of this center of infection, measures were taken to study the disease spreading ability of *R. lacustre* after the removal of *R. inerme*.

In the fall of 1928 the surveying and mapping of the plot area was started. In the spring of 1929 this work and the initial eradication of *R. inerme* were completed.

During the summer of 1929 the white pine trees and *R. lacustre* bushes on the plot were tagged, their locations plotted on the plot map, basic data recorded for each, and all examined for infection. Each canker found was marked with a numbered tag. Infection data were recorded for each canker and for each infected *R. lacustre* bush.

Annually, since 1929, the area has been reworked for *R. inerme* and data have been taken on the plotted pines and Ribes. In 1931 the study was augmented by the establishment on the plot of seven small plantations of *Pinus monticola*, *P. strobus*, and *P. flexilis* transplants. In June of the same year, a cooperative weather station was established on the plot in order to more accurately measure the meteorological factors affecting the spread and intensification of the disease. This station was reestablished and operated in 1932 and 1933.

RESULTS

A. Eradication of Ribes inerme

In Table No. 1 are shown the amounts of *R. inerme* live stem removed from the plot each year. It is notable that the amount of live stem found in 1933 is the same as the amount found in 1932. Practically all the live stem found during these two years is from small seedlings and short sprouts from pieces of root or stem in a swamp.

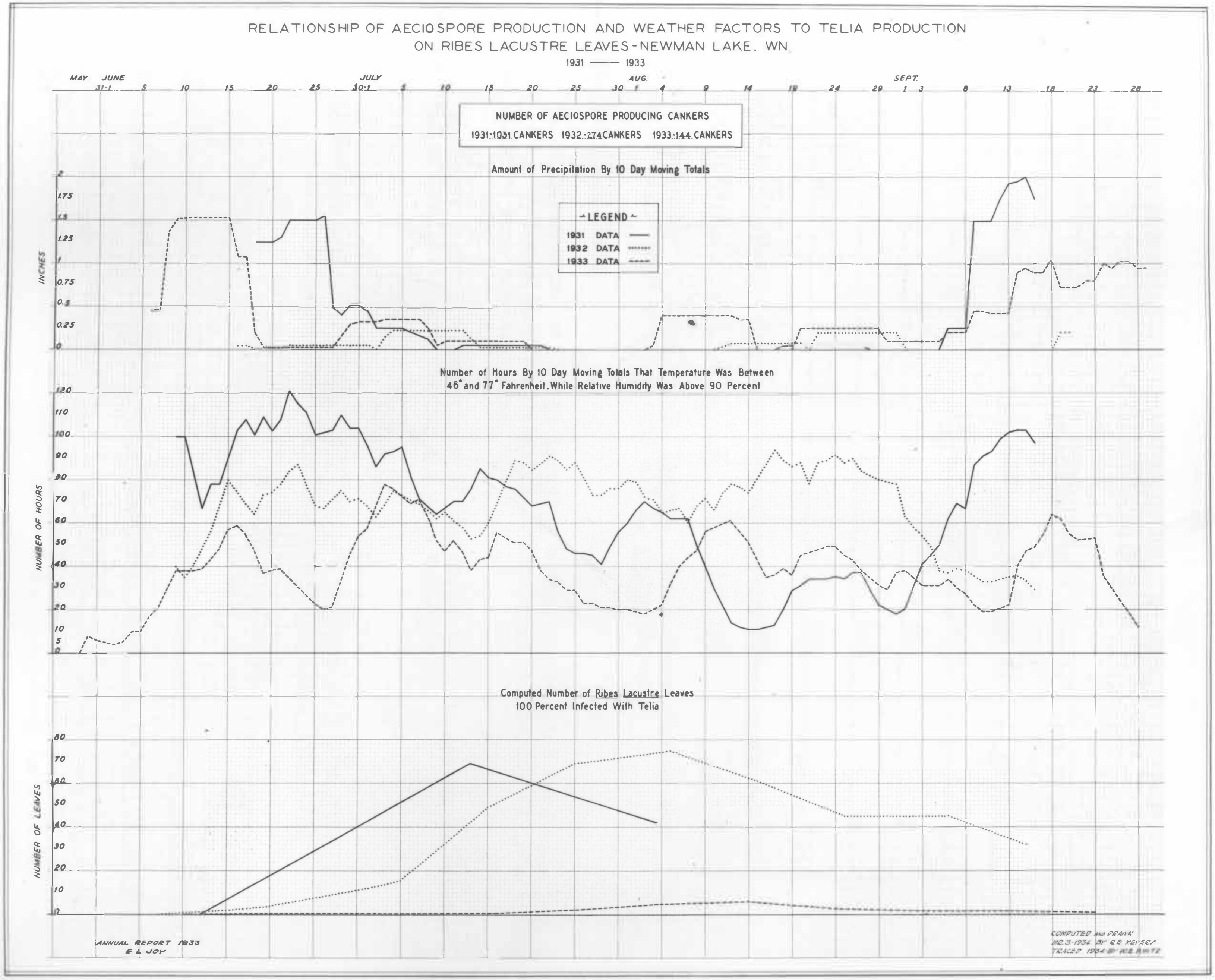
RELATIONSHIP OF AECIOSPORE PRODUCTION AND WEATHER FACTORS TO TELIA PRODUCTION
ON RIBES LACUSTRE LEAVES - NEWMAN LAKE. WN
1931 —— 1933
MAY JUNE JULY AUG. SEPT.
NUMBER OF AECIOSPORE PRODUCING CANKERS
1931:1031 CANKERS 1932:274 CANKERS 1933:144 CANKERS
Amount of Precipitation By 10 Day Moving Totals
INCHES
- LEGEND -
1931 DATA
1932 DATA
1933 DATA
Number of Hours By 10 Day Moving Totals That Temperature Was Between
46° and 77° Fahrenheit. While Relative Humidity Was Above 90 Percent
NUMBER OF HOURS
Computed Number of Ribes Lacustre Leaves
100 Percent Infected With Telia
NUMBER OF LEAVES
ANNUAL REPORT 1933
E. L. JOY
COMPUTED AND DRAWN
MC.3-1934 BY R.E. MEYERS
TRACED 1934 BY W.E. WHITE

TABLE NO. 1

AMOUNTS OF RIBES INERME ERADICATED FROM THE NEWMAN LAKE PLOT, 1929-1933

Year	Acres Worked	No. times area worked: Eradication Crew	No. times area worked: *Plot Crew	Total Feet of Live Stem Eradicated	Feet of Live Stem per Acre
1929	45.0	2	1	126,884	2,820
1930	45.0	1	1	1,012	22
1931	45.0	1	1	516	11
1932	47.6	1	1	373	8
1933	50.0	1	1	395	8
Totals and Ave.	46.5	6	5	129,180	2,869

*Not a systematic coverage for R. inerme. These crews, during the course of their regular work, pull all R. inerme found.

B. Ribes Infection Data

Three inspections of the R. lacustre bushes on the plot were made in 1933. At each inspection quantitative estimates of the amount of infection on each infected bush were recorded.

Table No. 2 gives a comparison of the percentages of bushes infected, on comparable inspection dates, during the past three years.

TABLE NO. 2

PERCENTAGES OF RIBES LACUSTRE BUSHES, CLASSIFIED BY SHADE FORM, THAT WERE INFECTED ON COMPARABLE INSPECTION DATES, 1931-1933

Year of Examination	Percentages of bushes infected: No shade			Half shade			Full shade			All forms		
	June	July -Aug.	Aug.-Sept.	June	July -Aug.	Aug.-Sept.	June	July -Aug.	Aug.-Sept.	June	July -Aug.	Aug.-Sept.
1931	14.3	20.4	20.4	24.5	32.4	36.1	16.4	24.2	27.4	20.7	28.4	31.6
1932	13.9		25.7	22.4		41.7	16.6		34.8	19.2		37.6
1933	0.0	26.2	28.6	0.7	26.1	28.4	2.2	29.7	31.3	1.4	28.0	30.0

From observations made in May and early June of 1933 it was evident that the cold, wet weather of spring was retarding the development of rust on Ribes. These observations are substantiated in Table No. 2 where it is seen that in June 1933 the percentages of infected bushes of every shade form were negligible, as compared with the percentages in June of the two preceding years. However, warm weather after June 10 stimulated the rust activity to such an extent that the percentages at the second inspection, made during late July and early August, and third, during late August and early September, were comparatively high.

It is also notable in Table No. 2 that of the three shade classes of bushes, the full shade form had the highest percentage of infected bushes in 1933 whereas the half shade form led in 1931 and 1932. Here again, the variation in weather conditions probably had sufficient influence to cause this change.

For each infected R. lacustre bush on the plot, data were recorded on the amounts of infection found on leaves at each inspection. The data have been summarized and converted to show the equivalent number of leaves, 100 percent covered with each of uredinia, telia, and necrotic area. For the purpose of securing more complete information on the rust development on Ribes, infection data were taken every 10 days on 6 bushes of each shade form.

The analysis of infection data from all the bushes is given in Table No. 3 and from the selected bushes in Table No. 4.

TABLE NO. 3

ANALYSIS OF INFECTION ON LIVING LEAVES OF RIBES LACUSTRE
NEWMAN LAKE, WASHINGTON, 1933

Degree of Shading	Period of Examination	Total Number Leaves Infected	Percent Infection Per Infected Leaf	Total Infection Converted to Equivalent Number Leaves 100 Percent			
				Uredinia	Telia	Necrotic	Total
No Shade	June	0	0.00	0.0	0.0	0.0	0.0
	July-Aug.	223	10.80	7.8	14.2	2.2	24.2
	Sept.	258	10.10	2.8	7.9	15.3	26.0
Half Shade	June	2	0.05	0.1	0.0	0.0	0.1
	July-Aug.	3,499	13.30	145.9	277.9	40.3	464.1
	Sept.	6,679	16.20	112.0	472.5	495.5	1,079.8
Full Shade	June	13	0.02	0.2	0.0	0.0	0.2
	July-Aug.	8,359	22.80	576.7	1,088.3	245.1	1,910.1
	Sept.	12,443	26.20	356.2	1,188.8	1,712.5	3,257.5
All Forms	June	15	0.02	0.3	0.0	0.0	0.3
	July-Aug.	12,081	19.80	730.4	1,380.4	287.6	2,398.4
	Sept.	19,380	22.50	471.0	1,669.2	2,223.1	4,363.3

TABLE NO. 4

ANALYSIS AT 10 DAY INTERVALS OF INFECTION
ON LIVING LEAVES OF 18 R. LACUSTRE BUSHES
NEWMAN LAKE, WASHINGTON, 1933

Degree of Shading	Inspection Date	Total No. Leaves Infected	Percent Infection Per Infected Leaf	Total Infection Converted To Equivalent Number Leaves 100 Percent Infected			
				Uredenia	Telia	Necrotic	Total
No Shade	June 25	35	2.2	0.736	0.021	0.003	.760
	July 5	54	4.1	2.080	0.101	0.009	2.190
	15	54	5.2	2.469	0.216	0.135	2.820
	25	84	7.9	2.225	3.403	0.992	6.620
	Aug. 4	142	10.5	2.266	10.457	2.177	14.900
	14	148	11.1	1.755	8.618	6.077	16.450
	24	133	12.3	0.582	7.483	8.295	16.360
	Sept. 3	107	10.8	0.242	4.304	7.054	11.600
	13	126	9.2	0.925	3.283	7.352	11.560
	23	82	6.9	0.000	1.330	4.300	5.630
One-Half Shade	June 25	72	3.9	2.798	0.032		2.830
	July 5	129	4.9	6.087	0.201	0.022	6.310
	15	201	7.3	12.981	1.384	.365	14.730
	25	326	10.4	17.386	13.928	2.686	34.000
	Aug. 4	497	14.0	19.381	42.029	8.330	69.740
	14	371	14.8	2.610	35.320	17.030	54.960
	24	315	12.4	2.448	16.433	20.149	39.030
	Sept. 3	261	10.6	0.892	10.184	16.594	27.670
	13	306	12.0	4.444	5.712	26.444	36.600
	23	221	10.1	.393	4.259	17.748	22.400
Full Shade	June 25	19	4.5	0.860			0.860
	July 5	33	5.0	1.650			1.650
	July 15	47	7.9	3.328	0.232	0.160	3.720
	July 25	143	13.5	12.146	4.779	2.395	19.320
	Aug. 4	161	17.4	12.927	11.404	3.609	27.940
	14	163	20.5	3.295	20.135	9.930	33.360
	24	192	21.2	3.793	21.377	15.630	40.800
	Sept. 3	169	18.7	1.753	13.381	16.546	31.680
	13	210	26.2	8.390	22.280	24.430	55.100
	23	161	27.3	2.154	20.931	20.955	44.040
All Forms	June 25	126	3.5	4.394	0.053	0.003	4.450
	July 5	216	4.7	9.817	0.302	0.031	10.150
	15	302	7.0	18.778	1.832	.660	21.270
	25	553	10.8	31.757	22.110	6.073	59.940
	Aug. 4	800	14.1	34.574	63.890	14.116	112.580
	14	682	15.4	7.660	64.073	33.037	104.770
	24	640	15.0	6.823	45.293	44.074	96.190
	Sept. 3	537	13.2	2.887	27.869	40.194	70.950
	13	642	16.1	13.759	31.275	58.226	103.260
	23	464	15.5	2.547	26.520	43.003	72.070

In correlation with the fact that the highest percentage of infected bushes were in full shade, Table No. 3 shows that leaves of bushes in this class had the highest average percent infection per infected leaf and produced the greatest amount of telia. Although the half shade bushes in 1931 and full shade in 1932 had the highest percentage infection per infected leaf, telia production in both of those years was greatest on half shade bushes.

The large amount of uredinial infection found during the September inspection is significant. Rains on August 30 and September 1, followed by warm weather, caused a new generation of uredinia thereby accounting for the large amount found. This is substantiated in Table No. 4, where it is seen that after a decline in the amount of uredinial infection from August 4 through September 3, there was a marked increase recorded for bushes of all forms on September 13. Since very few new leaves were developing at this late date, most of the uredinial infection was on old, hardened leaves. In column three, it is seen by the increase in total number of leaves infected on this date, that much of this new infection was on previously uninfected leaves.

The September 13 peak of uredinial infection was quite secondary to the main peak reached on August 4. It is important to note, however, that before this date there was a large amount of uredinia at each of the July 5, 15 and 25 inspections. This accounts for the peak of telia development on the open and half shade forms coming on the same date as the peak of uredinia. The delay of peak telial production on the full shade bushes until September 13, with heavy production all through August and September, is undoubtedly due to the effect of shade as a moderator of telia development. This is indicated by the fact that the first telia were not developed on full shade bushes until July 15, or 20 days after they were found on bushes of the other forms.

Each year the infection potential of the R. lacustre on the plot is determined by the amount of telia produced. In Table No. 5 is given a comparison of the amounts computed for each inspection of the Ribes since the first data were taken in 1929.

TABLE NO. 5

COMPARISON OF AMOUNT OF TELIA PRODUCED IN 1929, 1930
1931, 1932, AND 1933

Period Examined	Computed Number of Leaves 100 Percent Infected with Telia	Percent of Total Infection Which is Telia
June-August 1929	0.02	2.5
June-August 1930	32.33	62.3
June 1931	28.03	34.5
July 1931	545.48	62.7
August 1931	481.04	61.1
June 1932	3.61	2.6
August 1932	2,951.15	58.5
June 1933	0.00	0.0
July-August 1933	1,380.41	57.6
Sept. 1933	1,669.24	38.3

It is evident that since the plot establishment in 1929, there have been three years in which large quantities of telia have been produced on the R. lacustre of the plot, 1932 being the peak year. Since the large number of 1927 origin cankers did not produce an abundance of aeciospores until 1931, the small amount of telia produced in 1929 and 1930 and larger amount in 1931 are at least partially explained. However, the increase in telia production in 1932 and 1933 over the amount produced in 1931 cannot be explained this way since the number of fruiting cankers decreased during this same three year period from 1,031 to 144. Thus, we are compelled to assume that weather conditions were more responsible than the number of fruiting cankers for this difference in telia production.

In an attempt to determine the correlation of weather factors with telia production, data were compiled from the daily weather records from the plot for the past three years, and from the infection records for a few selected bushes that were examined at frequent intervals during each of these years. Precipitation, because of its known influence, was computed for each summer season by ten day moving totals. In like manner, the number of hours of relative humidity above 90 percent during which hours the temperature ranged from 46 to 77 degrees Fahrenheit were computed. These results, with data on the aecia and telia production for these years, are presented in Graph No. 1.

Briefly, Graph No. 1 brings out the following points for each year:

1931

Although there were 1,031 aecia producing cankers, and ample precipitation and warmth during late June and early July for rapid telial development, the increase in telial development after July 13 was prevented by extremely hot and dry weather.

1932

Even though the number of fruiting cankers was reduced to 274 there were sufficient aeciospores to infect a higher percentage of bushes than in 1931 (Table No. 2). A favorable moisture-temperature condition probably accounts for this. Continuation of this favorable combination throughout the season is responsible for the abundance of telia produced.

It is notable that the amount of rainfall during the 1932 season was very small. Its occurrence in small amounts at frequent intervals almost throughout the season, therefore, must have been most conducive to the production of telia.

1933

An even greater reduction in the number of fruiting cankers to 144 was not sufficient to materially reduce the percentage of bushes infected (Table No. 2). However, due to the cold, wet spring weather, infection of the Ribes was delayed. The continuation of unfavorable moisture-temperature conditions, as reflected by the low curve, prevented abundance telial development.

From Graph No. 1, it appears that the moisture-temperature curve is a fair index of telial development. If the combination of 90 percent relative humidity with 46-77 degrees temperature represents reasonably good conditions for this development, it appears that this combination will have to persist for approximately 60 out of every 240 hours (10 days), or 25 percent of the total time.

C. Pine Infection Data

A comparison of the pine infection data secured in 1933 with comparable data from inspections in previous years is given in Table No. 6. Table No. 7 is the analysis of all cankers found in 1933.

TABLE NO. 6

PINE INFECTION DATA, NEWMAN LAKE, WASH. 1929-1933

Item	Year 1929	1930	1931	1932	1933
Number of Acres Studied	25.4	36.2	36.3	47.6	50
Total Number Pine Examined	752	1,334	1,336	1,437	1,315
Total Number Pines Infected	66	113	128	170	171
Percent Pines Infected	8.8	8.5	9.6	11.8	*11.9
Number Pines Killed by Blister Rust	0	0	4	7	11
Total Number of Cankers	565	1,591	1,935	2,156	2,217
Number Cankers Per Infected Pine	8.6	14.2	15.1	12.7	13

*Based on number examined in 1932.

TABLE NO. 7

ANALYSIS OF CANKERS, NEWMAN LAKE STUDY PLOT, 1933

Year of Growth Infected	Juv.	First Pyc.	Pyc. Scar	Fruited Once	Twice	Sev.	Fr. Ret'd	Dead	Missing	?	Not Exam. 1933	Total
1931									1			1
1930												
1929	1											1
1928	1	1	4	1	3	2	7	18	1			38
1927			12	5	15	18	72	256	2	2	24	406
1926			11	9	12	43	200	766	8		65	1,114
1925			17	7	5	15	71	341	3		23	482
1924			3		1	3	16	92			3	118
1923				1			5	18			1	25
1922						2	6	9			2	19
1921						1	1	6			1	9
1920								1				1
1919				1								1
1918							1					1
?								1				1
Total	2	1	47	24	36	84	379	1,508	15	2	219	2,217

It is notable in Table No. 6 that one additional infected pine and 61 unrecorded cankers were found in 1933. Most of the 61 cankers were visible but had been missed in 1932 having originated in 1928.

The number of pines killed by blister rust is increasing annually, 4 more having been recorded in 1933 to bring the total to 11. Several more on the plot will be killed by cankers within the next few years.

The eradication of R. inerme from the plot in the spring of 1929 removed the disease spreading effect of this species after 1928. This assures us that all cankers originating in 1929 and since are from the R. lacustre on the plot.

In Table No. 7 it is seen that only a few cankers can be charged to R. lacustre infection since 1929. These include one on each of 1929 and 1931 growths, the two incipient cankers on 1928 growth and about 10 in the "Pycnial Scar" column. Thus, the total number of cankers from R. lacustre is 14 or only six-tenths of one percent of the total on the plot.

The large number of dead cankers, constituting 68 percent of the total, is indicative of the rapid death of cankers in four to five years after they are visible in the bark. Most of these are on branches killed by other cankers nearer the trunk.

D. Pine Plantation Data

In May 1931, 2,340 white pine transplants were planted on the plot in seven units. The total consisted of 988 each of P. monticola and P. strobus and 364 P. flexilis.

Due to a long period of drought immediately following the planting, many of the trees died. The results of a check made April 13, 1934, show an average of only 20 percent survival. No infection was found. Table No. 8 gives the results of this check.

TABLE NO. 8

SURVIVAL OF PLANTED PINES, NEWMAN LAKE, WASHINGTON

Unit	Number Planted May 1931				Data	No. and Percent Surviving April 1934			
	P.mont.	P.stro.	P.flex.	Total		P.mont.	P.stro.	P.flex.	Total
A	133	133	0	266	No.	27	26	-	53
					Per Cent	20.3	19.5	-	20.0
B	88	88	88	264	No.	1	0.0	0.0	1
					Per Cent	1.1	0.0	0.0	0.4
C	198	198	0	396	No.	22	21	-	43
					Per Cent	11.1	10.6	-	11.0
D	171	171	171	513	No.	72	47	30	149
					Per Cent	42.1	27.5	17.5	29.0
E	158	158	0	316	No.	52	45	-	97
					Per Cent	32.9	28.5	-	30.7
F	135	135	0	270	No.	8	17	-	25
					Per Cent	5.9	12.6	-	9.3
G	105	105	105	315	No.	53	36	13	102
					Per Cent	50.5	34.3	12.4	32.3
Total	988	988	364	2,340	No.	235	192	43	470
					Per Cent	23.8	19.4	11.8	20.1

E. Summary

1. The Newman Lake infection center, probably caused by R. inerme in 1923, was found in 1928.

2. A plot was established in 1928-29 to study the disease spreading ability of R. lacustre only, after the removal of R. inerme.

3. A total of 2,869 feet of R. inerme live stem per acre was removed during the 1929 and subsequent workings of the area.

4. Over 600 R. lacustre bushes on 50 acres are inspected annually. These average approximately 13 bushes with 683 feet of live stem per acre.

5. From 30 to 38 percent of these bushes were infected in each of past three years.

6. The total equivalent leaf area producing telia varied from 545 to 2,951 leaves in each of the past three years.

7. From a graphic correlation of weather and telia date, it appears that the greatest production of telia occurs with a combination of high relative humidity and moderately warm weather during one-fourth or more of the total consecutive hours of the season of telial production.

8. The cankers on the plot in 1933 totaled 2,217.

9. Only about 14 cankers have resulted from the amounts of telia produced on *R. lacustre* since the eradication of *R. inerme* in 1929. This is less than one percent of the number produced prior to the removal of R. inerme.

10. Of 2,340 white pine transplants planted on the plot in 1931, only 20 percent were alive in April 1934.

PHOTOGRAPHIC AND EDUCATIONAL WORK

By
H. Miller Cowling
Agent

INTRODUCTION

The policy of this department was continued along the same lines as in 1932. Photographic work was the major project, and educational work was conducted through the members of the Division personnel upon the basis of demand. This report deals only with the work of the Spokane office.

PURPOSE

The purpose of this department, through the facilities of its own photographic equipment is:

1. To furnish the blister rust control personnel with illustrative material of all phases of investigative and practical control, the progress and results of each project, and its relationship to the entire blister rust program, and

2. To educate the general public and special groups through the dissemination of photographs, specimens and instructive bulletins among eradication camps. Forest Service workers, timber owners and operators, forestry schools and students, and other interested groups and individuals, to the end that the potential timber assets and value of the blister rust control program will be fully appreciated.

SUMMARY OF WORK DONE

Photographic and educational work come under four headings: (A) photography in the office, (B) photography in the field, (C) distribution of educational materials, and (D) distribution of information.

A. Photography in the Office

Photography in the office falls under four classifications: (1) reproducing and coloring large maps for special reports, (2) reducing large maps and tables to special and annual report size, (3) developing and printing of all field pictures for office use, and (4) making up photographic material for educational purposes.

1. When large maps are necessary for special reports, the original is photographed and then enlarged on a light weight, crack-proof paper to any size required by the reports. Type lines and working unit boundaries are inked in on the reproduced map. The different Ribes eradication types are colored in separate colors with transparent oil paint. This permits the details of the map to be entirely visible through the coloring. During the year, maps as large as 30x40 inches were turned out and colored up to eight separate colors.

There are many advantages to this method. The size of the reproduced map is optional; the colors are more quickly and evenly applied than by the former use of crayons, and the cost of reproducing in comparison with the old Van Dyke method has been reduced 52 percent. All maps that the Division of Blister Rust Control used during the year for field purposes were redrawn and reproduced. They carried only the data essential to blister rust control work. These reproductions have in all cases outlasted other field maps going through the same amount of usage, because of the permanency of the colors and durability of the paper.

The reproducing of large tables was adopted this year for the first time in the form of the Ribes eradication summaries. The complete tables used in this summary were first typed as a whole, or in parts, and then arranged and mounted as separate pages. The pages were photographed and then enlarged to a standard size of type and page. The typing was reduced slightly in size, but is perfectly legible. All fittings of the several small tables were blocked out in such a way that the reproduced pages appeared as one page of tables typed on one sheet of paper. There were seven complete summaries turned out. Each summary contained 32 photographic pages, 19 inches by 19½ inches in size.

2. The reducing of large maps and tables to special and annual report size is done by photographing them on an 8x10-inch film. Any number of prints can then be printed on a special lightweight and crack-proof paper, 9x11 inches in size. The prints are trimmed to report size leaving a border for binding. Examples of this method appear in practically all of the reports in this volume.

All photographic work of the office is done through the facilities of the dark room. Pictures can be made to meet the exact demands for which they are needed.

3. By this arrangement pictures can be made to meet the exact demands for which they are intended. The dark room is equipped, at the present time, to take care of all sizes of contact printing, enlarging from five by seven negatives, and the making of lantern slides. In cases where enlargements are made from eight by ten negatives it has been necessary to use the equipment of the 116th Photo Section, Washington National Guard. This has caused some loss of time and inconvenience, but steps are being taken to obtain the equipment necessary to do all the work in our own laboratory.

4. The assembling of material for educational purposes consisting chiefly of printing and enlarging field pictures, map and charts showing all phases of the blister rust control program. Lantern slides are printed and colored to furnish material for illustrated lectures. This method allows a flexibility of illustration, and assures that a supply of suitable lantern slides can always be obtained.

B. Photography in the Field

Photography in the field has two classifications, (1) ground and (2) aerial.

Ground photography is done entirely with a view camera that uses a five by seven inch film. All projects are visited by the photographer during the field season. The project supervisor of each project outlines the pictures he wants taken, and he or his assistant accompanies the photographer while the area is being covered. This method assures that the purpose of all pictures taken is in accord with the ideas of both project supervisors.

The system of series pictures as introduced two years ago was used extensively this year. To secure series pictures, a plot or area is photographed from the same point over a period of months or years. For example, areas or plots are photographed before, immediately after, one year after, and two years after eradication of Ribes. Thus, a permanent, graphic record is obtained, which is especially valuable to chemical, investigative, and bulldozer methods of Ribes eradication. (Examples of series pictures appear in other portions of this annual report.)

2. Aerial photography was used extensively this year. Both vertical and oblique pictures were taken in order that additional information might be had of the large areas opened for Ribes eradication under the ECW program.

Cameras and photographic equipment of the 116th Photo Section, and airplanes of the 116th Observation Squadron, 41st Division Aviation, Washington National Guard were used to obtain the aerial photographs. A pilot from the squadron who has had photographic training, was appointed to fly the plane used in aerial work and to assist the project leader in the laboratory.

Oblique pictures were taken of the Palouse Division of the St. Joe National Forest in April, to assist the project supervisor of that area to plan his work for the season. These pictures, seven by nine inches in size, were taken from over the side of the airplane, at an altitude of 10,000 feet above sea level. Approximately 15 square miles were covered in each picture, showing clearly the topography, all drainages, and timber densities of the areas photographed.

All of the vertical pictures were taken in the process of mapping the Clarkia, Idaho area. They cover 113 square miles of the upper drainage of the Middle Fork of the St. Maries River. This map, made as a mosaic from 421 vertical pictures taken at an altitude of 15,000 feet above sea level was erratic in scale due to rapid contour changes. The original purpose of this map which was to show all the drainages and timber densities of the area, was satisfactorily completed. It was of some aid to the men in the field. The cost of oblique photography is less, and for this reason it is preferred in obtaining this type of information.

Toward the end of the field season, aerial photography was again brought into use to assist the preeradication parties in the field. All of the drainages in the areas covered by these parties were photographed from 10,000 feet above sea level. Each party leader was furnished a set of pictures for his area. A total of 721 aerial pictures was taken during the season.

In comparing the value of the two types of aerial photography, oblique pictures are favored for general use. Mapping costs $6 per square mile, while the average cost of oblique pictures if $1.05 per picture, including one print.

C. Distribution of Educational Material

The large volume of photographic work made it impossible to gather any new specimens of the disease on Ribes or pines during the year. A good supply of specimens of all stages is still on hand with the exception of the uredinial stage on dried Ribes leaves. Orders for specimens, chiefly of pickled Ribes leaves, etc., were filled when requested.

Demonstration boxes and field manuals made up in previous years were used in all of the Ribes eradication camps. A sufficient number of these items were on hand to take care of the demand. Pamphlets and bulletins covering all phases of the blister rust control program were used extensively. These publications vary from the most technical data to a general description of blister rust and its control, and are distributed according to the purpose for which they are to be used.

D. Distribution of Information

1. Division of Blister Rust Control personnel. The Western News Letter and the monthly personnel meetings are the two mediums employed to distribute information to the blister rust control workers.

The News Letter was continued as a monthly publication under the direction of S. N. Wyckoff, Senior Pathologist, with the editorship rotating among the office personnel. Articles were written on blister rust and allied subjects by members of the permanent organization, with a few articles coming from outside sources. Both the theory and the practice of all work in connection with the blister rust control program were discussed through this medium, which is confidential in nature and was issued to permanent employees and a few interested parties.

Monthly personnel meetings were held on the first Wednesday of each month during the winter season. From January to May meetings were held bimonthly in order to complete the wide range of subjects submitted for discussion. At each meeting two or three talks were given on subjects related to the blister rust control program. A general discussion of each subject followed the talks.

2. General public. During 1933, newspapers gave the blister rust control program wide publicity by printing articles and pictures that were released to them. This interest was greatly aroused by the creation of the ECW program.

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Photographic Work Done in the Spokane Office

Prints 4"x5" or smaller	165
" 5"x7"	1,482
" 8"x10"	3,199
" 9"x11"	999
Enlargements, 16"x22" or smaller	63
" 20"x26"	258
" 30"x40"	52
Copies, 5"x7"	43
" 8"x10"	64
Lantern slides - black and white	322
" " colored	12
Roll films developed	6
Film developed 5"x7"	207

Educational Material Sent Out

Pickled telia	1 quart
" uredinia	1 quart
" pine specimens	4 quarts
Bulletins #23	254
" #27	23
" #1398	25
S. N. Wyckoff's B.R.C. article	24
Seven-stage boxes	2
Mounted telia	28
" uredinia	3
Enlargements, 11"x18"	12

The four illustrated pages following this report are reproductions of a four-panel display sent to Washington, D. C., for educational work. The panels are 3-winged, five feet wide and four feet high and are hinged for convenience in shipping. They represent four phases of the blister rust control methods.

Blister Rust Control

Aerial Photography Aids in Planning Work

Photos by 116th Photo Section, Washington National Guard.
H. Miller Cowling, Photographer — Dale L. Swartz, Pilot

Rugged country, approaching the upper limits of white pine, western Montana

Forested slopes, partially cut over. Lumber mill in the foreground, north Idaho

White pine forests in the mountains of western Montana

A burned over area, just beginning to reproduce to white pine, north Idaho

Aerial pictures help to locate boundaries between young and mature white pine stands

Large area of second growth white pine, north Idaho.

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Blister Rust Control

Hand Eradication of Ribes

"Ribes pullers" at work in the north Idaho woods. The string cone is thrown forward to mark the strip.

Civilian Conservation Corps men pulling Ribes in north Idaho.

"Heavy going" in a stream bottom. North Idaho.

Ribes bracteosum at the base of Narada Falls, Mount Rainier National Park, Washington.

The same area at Narada Falls one year after Ribes eradication.

Two years after Ribes eradication at Narada Falls. The area is covered with harmless brush; species of Rubus and Menziesia.

BLISTER RUST CONTROL

CHEMICAL ERADICATION OF RIBES

Ribes petiolare prior to spraying with sodium chlorate, north Idaho.

Ribes inerme, prior to spraying with ammonium thiocyanate, north Idaho.

A sprayer, filling his spray tank at a "filling station", north Idaho.

The same clump of Ribes petiolare one year after spraying with sodium chlorate.

Ribes inerme one year after spraying with ammonium thiocyanate.

A crew of sprayers working in a stream bottom. Note the strings marking of each man's lane. North Idaho.

BLISTER RUST CONTROL

MECHANICAL ERADICATION OF RIBES

Dense growth of Ribes inerme in a north Idaho stream bottom.

A "bulldozer" at work, clearing the brush containing Ribes.

Brush and debris piled by the "bulldozer" and ready for burning.

A brushy stream bottom, with dense Ribes growth, along the Coeur d'Alene River, Idaho. The "bulldozer" is in the center of the area, ready to uproot and pile the brush.

The same area, after the "bulldozer" had finished its work. The windrows of uprooted Ribes and other brush will be burned and the area will later be seeded to grass.

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EXPENDITURES BY THE
WESTERN DIVISION OF BLISTER RUST CONTROL
CALENDAR YEAR 1933

Federal Expenditures

The following tabulations of federal expenditures for the period January 1, 1933 to June 30, 1933 and July 1, 1933 to December 31, 1933 and NIRA expenditures for the period August 22, 1933 to December 31, 1933, summarize by projects and objects the expenditures of the Western Division of Blister Rust Control.

These tabulations are prepared from detailed expenditure card records maintained by fiscal years for each project and which show the classification of all expenditures as to objects of expenditure, based on the expenditure classifications required by the Bureau of the Budget and the General Accounting Office.

TABLE NO. 1

FEDERAL EXPENDITURES, WESTERN DIVISION OF BLISTER RUST CONTROL
JANUARY 1, 1933 - JUNE 30, 1933, REGULAR APPROPRIATION

	Project	Salaries	Expenses	Total	Recapitulation of Expenses						
					Sub-sistence Expenses	Railroad Fares, Pullman, Stage, etc.	Operation Person-ally Owned Cars	Cost of Transportation in Government Trucks and Sedan	Express, Freight, Trucking and Packing**	Supplies and Equipment***	Repairs, Rents and Miscel-laneous Expenses
2.2	Developing Methods of Ribes Eradication										
	2.22 - Method Studies of Ribes Eradication, Idaho	$ 1,782.12	$ 822.58	$ 2,604.70	$ 28.84	-	$ 4.90	$ 5.51	$ 183.24	$ 518.95	$ 61.14
	2.25 - Experimental Ribes Eradication, California	215.26	55.64	270.90	-	$ 2.10	-	15.76	-	.75	37.03
2.3	Developing and Testing Ribicides and Barberricides										
	2.3-1 - Laboratory Investigations, Ribicides	6,330.51	1,182.15	7,512.66	238.00	188.75	-	28.67	1.70	454.47	270.56
	2.3-1 - Laboratory Investigations, Barberricides #	2.72	106.17	108.89	-	-	2.05	-	.84	28.88	74.40
	2.3-2 - Field Tests of Ribicides	953.38	349.44	1,302.82	251.51	15.28	16.00	33.76	4.62	28.01	.26
2.4	Field Studies in Ribes Ecology										
	2.42 - Idaho	172.10	187.83	359.93	35.63	-	52.20	-	-	-	100.00
	2.45 - California	916.44	135.25	1,051.69	-	2.55	-	-	119.68	7.04	5.78
3.1	Control Reconnaissance on Federal Lands										
	3.15 - California	2,574.46	46.76	2,621.22	-	4.30	-	16.29	-	1.20	24.97
3.2	Cooperative Ribes Eradication on Federal Lands ##										
	3.21 - Savenac Nursery, Montana	12.75	42.76	55.51	1.00	-	11.80	-	2.32	27.64	-
	3.22-1 - Clearwater National Forest, Idaho	2,020.72	1.10	2,021.82	-	-	-	1.10	-	-	-
	3.22-2 - St. Joe National Forest, Idaho	1,751.14	70.02	1,821.16	-	-	-	70.02	-	-	-
	3.22-3 - Coeur d'Alene National Forest, Idaho	605.65	2,198.17	2,803.82	5.51	-	10.10	36.23	139.75	1,766.80	239.78
3.3	Cooperative Ribes Eradication in National Parks ##										
	3.33 - Mount Rainier National Park, Washington	749.88	-	749.88	-	-	-	-	-	-	-
3.4	Cooperative Ribes Eradication on Private and State Lands ###										
	3.42-1 - Clearwater Timber Protective Association, Idaho	1,308.27	211.52	1,519.79	7.00	17.00	-	10.99	-	36.78	139.75
	3.42-3 - State of Idaho and Local Owners, Vicinity Clarkia, Idaho	15.90	31.74	47.64	-	-	-	-	-	14.65	17.09
	3.42-4 - State of Idaho, Priest Lake, Idaho	910.85	8.09	918.94	-	-	-	-	-	-	8.09
4.1	Field Studies, Spread of the Rust										
	4.11 - Montana	1,030.24	3.50	1,033.74	-	-	-	-	-	-	3.50
	4.12 - Idaho	146.66	-	146.66	-	-	-	-	-	-	-
	4.13 - Washington	1,465.94	44.55	1,510.49	14.25	26.75	-	3.25	-	-	.30
	4.14 - Oregon	1,531.68	191.18	1,722.86	55.50	2.65	128.20	-	-	2.75	2.08
	4.15 - California	1,734.96	154.27	1,889.23	80.01	22.82	36.95	11.24	-	1.30	1.95
4.2	Damage to Pine Studies	3,477.63	648.36	4,125.99	217.02	15.65	49.80	36.29	67.68	261.92	-
5.1	Cooperation with Forest Service, ECW Ribes Eradication on Federal Lands										
	5.12-1 - Clearwater Operation, Idaho	1,384.79	4,206.69	5,591.48	263.19	30.22	-	101.34	339.29	3,309.81	162.84
	5.12-2 - St. Joe Operation, Idaho	1,172.73	4,271.24	5,443.97	26.97	2.19	-	74.25	305.84	3,700.52	161.47
	5.12-3 - Coeur d'Alene Operation, Idaho	1,167.07	2,775.77	3,942.84	40.25	-	-	102.37	185.67	2,392.31	55.17
	5.15-1 - Plumas Operation, California	471.58	286.66	758.24	61.80	2.25	-	70.43	29.41	80.10	42.67
	5.15-3 - Eldorado Operation, California	266.48	415.19	681.67	30.30	3.76	-	48.60	16.82	310.51	5.20
	5.15-4 - Stanislaus Operation, California	736.64	742.55	1,479.19	153.67	29.60	-	91.73	55.35	393.06	19.14
5.2	Cooperation with Forest Service, ECW Ribes Eradication on State and Private Lands										
	5.22-1 - Clearwater Operation, Idaho	634.09	1,838.06	2,472.15	64.85	-	-	29.80	120.08	1,591.61	31.72
	5.22-2 - St. Joe Operation, Idaho	564.20	2,404.54	2,968.74	17.82	-	-	40.22	135.46	2,186.13	24.91
	5.25-1 - Calaveras State Park, California	81.40	111.47	192.87	8.35	.05	-	.49	4.23	98.35	-
5.3	Cooperation with Park Service, ECW Ribes Eradication in National Parks										
	5.35-1 - Yosemite National Park, California	182.04	292.48	474.52	41.63	.05	-	3.42	8.41	238.97	-
6.	Educational Work, Spokane Office	1,015.90	504.81	1,520.71	7.00	-	-	27.69	12.97	375.89	81.26
9.	Maintenance of Field Office and Miscellaneous Expenses										
	9.1 - Supervision	2,031.54	94.26	2,125.80	19.00	71.57	-	3.69	-	-	-
	9.2 - Office Maintenance	6,394.84	2,136.11	8,530.95	-	-	-	-	-	-	2,136.11
	9.3 - Miscellaneous Supplies and Services Paid on L/A	-	421.17	421.17	-	-	-	81.62	14.40	198.11	127.04
	9.4 - Miscellaneous Supplies and Services Paid in Washington, D.C.	-	121.45	121.45	-	-	-	-	62.86	57.87	.72
	Total January 1, 1933 - June 30, 1933	$45,812.56	$27,113.53	$72,926.09	$1,669.10	$437.54*	$312.00	$944.76	$1,810.82**	$18,064.38***	$3,654.93

#Expenditures from $1,500 allotment from Division of Barberry Eradication for fiscal year 1933.
##See also project 5.1 for costs of ECW cooperative Ribes eradication on National Forests and National Parks.
###See also project 5.2 for costs of ECW cooperative Ribes eradication on State and Private lands. No contributed funds disbursed for this project during field season 1933.

*Includes "Other Transportation" items in amount of $10.04, street car fares, checking baggage, etc.
**Includes $521.52 freight on 7 International trucks and $537.72 freight on 49,000 pounds twine.
***Includes $6,867.64 for 59,118 pounds twine and $1,047.18 for compasses, talley registers and spray tank pliers for projects 3.22-3, 5.12-1-2-3 and 5.22-1-2; and $5,918.22 for 15 trucks, assorted sizes charged 3.22-3, 4.2, 5.1 and 5.2.

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TABLE NO. 2

FEDERAL EXPENDITURES, WESTERN DIVISION OF BLISTER RUST CONTROL
JULY 1, 1933 - DECEMBER 31, 1933

	Project	Salaries	Expenses	Total	Recapitulation of Expenses: Sub-sistence Expenses	Railroad Fares, Pullman, Stage, etc.	Operation Person-ally Owned Cars	Cost of Transportation in Government Trucks and Sedan	Other Trans-portation Expenses	Express, Freight, Trucking and Packing	Supplies and Equipment	Repairs Rents and Miscel-laneous Expenses
2.2	Developing Methods of Ribes Eradication											
	2.22-1 - Clearwater National Forest, Idaho	$ 1,085.12	$ 319.28	$ 1,404.40	$ 133.91	-	$ 80.85	$ .65	-	$ 36.72	$ 27.44	$ 39.71
	2.22-2 - St. Joe National Forest, Idaho	1,722.96	2,487.52	4,210.48	-	-	-	-	-	677.08	1,803.04#	7.40
2.3	Developing and Testing Ribicides											
	2.3-1 - Laboratory Investigations	2,936.32	309.89	3,246.21	10.50	-	35.00	1.20	-	6.26	179.27	77.66
	2.3-2 - Field Tests of Ribicides	2,390.53	1,039.20	3,429.73	216.60	$166.23	106.86	41.32	$ 67.20*	32.57	400.22	5.20
2.4	Field Studies in Ribes Ecology											
	2.42 - Idaho	442.81	334.63	777.44	201.38	1.07	37.90	-	93.28*	-	1.00	-
3.2	Cooperative Ribes Eradication on Federal Lands											
	3.21 - Savenac Nursery, Montana	12.75	20.50	33.25	-	-	17.50	-	-	-	-	3.00
	3.22-3 - Coeur d'Alene National Forest, Idaho	2,251.00	2,005.61	4,256.61	37.34	-	-	31.28	80.39*	10.42	## 1,826.83	39.35
	3.24 - Oregon	-	51.34	51.34	17.85	-	-	32.51	-	-	.98	-
4.1	Field Studies, Spread of the Rust											
	4.12 - Idaho	137.04	66.88	203.92	63.25	-	-	3.63	-	-	-	-
	4.13 - Washington	1,147.44	-	1,147.44	-	-	-	-	-	-	-	-
	4.14 - Oregon	1,487.98	267.30	1,755.28	86.25	33.25	115.85	8.95	-	-	2.95	20.05
	4.15 - California	2,046.49	262.75	2,309.24	96.41	20.43	88.50	20.64	1.32	-	-	35.45
4.3	Damage to Pine Studies	1,368.48	529.78	1,898.26	396.77	8.55	62.70	58.01	.50	-	2.45	.80
5.1	Cooperation with Forest Service ECW Ribes Eradication on Federal Lands											
	5.12-1 - Clearwater Operation, Idaho	3,666.14	331.72	3,997.86	237.56	-	-	52.81	.50	1.23	-	39.60
	5.12-2 - St. Joe Operation, Idaho	2,697.55	225.47	2,923.02	150.86	-	-	63.76	-	3.46	7.39	-
	5.12-3 - Coeur d'Alene Operation, Idaho	3,210.03	249.93	3,459.96	128.87	-	-	107.68	-	4.38	3.90	5.10
	5.15-1 - Plumas Operation, California	1,287.24	208.06	1,495.30	147.44	1.92	-	28.27	2.03	-	10.98	17.42
	5.15-3 - Eldorado Operation, California	799.44	115.32	914.76	75.24	6.79	-	30.33	2.06	-	-	.90
	5.15-4 - Stanislaus Operation, California	2,042.04	293.72	2,335.76	173.27	.42	-	86.50	.20	3.17	1.70	28.46
5.2	Cooperation with Forest Service ECW Ribes Eradication on State and Private Lands											
	5.22-1 - Clearwater Operation, Idaho	1,432.45	170.90	1,603.35	135.04	6.45	-	13.66	-	-	.75	15.00
	5.22-2 - St. Joe Operation, Idaho	1,226.46	135.87	1,362.33	120.93	-	-	14.94	-	-	-	-
	5.25-1 - Calaveras State Park, California	244.20	29.93	274.13	22.54	-	-	7.14	-	-	.15	.10
5.3	Cooperation with Park Service ECW Ribes Eradication in National Parks											
	5.33-1 - Mount Rainier National Park, Washington	153.00	51.16	204.16	49.34	-	-	1.82	-	-	-	-
	5.35-1 - Yosemite National Park, California	764.56	61.87	826.43	52.43	-	-	9.44	-	-	-	-
6.	Educational Work, Spokane Office	714.00	301.74	1,015.74	26.22	-	124.80	-	-	-	146.72	4.00
9.	Maintenance of Field Office and Miscellaneous Expenses											
	9.1 - Supervision	1,954.92	113.96	2,068.88	58.00	21.81	-	-	33.05	-	-	1.10
	9.2 - Office Maintenance	4,397.64	1,942.21	6,339.85	-	-	-	-	-	-	-	1,942.21
	9.3 - Miscellaneous Supplies and Services Paid on L/A	-	287.03	287.03	-	-	-	70.53	-	9.36	119.09	88.05
	9.4 - Miscellaneous Supplies and Services Paid in Washington, D.C.	-	1.36	1.36	-	-	-	-	-	1.36	-	-
	Total July 1, 1933 - December 31, 1933	$41,618.59	$12 214 93	$53,833.52	$2,638.02	$266.92	$669.96	$685.07	$280.53	$786.01**	$4,514.66	$2,373.56

*Covers rental of cars and operating expenses for periods when no Government trucks available.
**Includes $671.13 for railroad and auto freight transportation of chemicals for project 2.22-2, approximately $66.96 in railway express still outstanding for all projects (3/5/34).

#Includes $1,747.12 for 10 tons ammonium sulfocyanate.
##Includes $1,804.80 for blade for bulldozer brush remover.

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TABLE NO. 3

FEDERAL EXPENDITURES, WESTERN DIVISION OF BLISTER RUST CONTROL
NIRA FUNDS, AUGUST 22, 1933 - DECEMBER 31, 1933

				Recapitulation of Expenses							
Project	Salaries	Expenses	Total	Subsistence Expenses	Railroad Fares Pullman Stage etc.	Operation Personally Owned Cars	Cost of Transportation in Government Trucks and Sedan	Other Transportation Expenses	Express, Freight, Trucking, and Packing	Supplies and Equipment	Repairs Rents and Miscellaneous Expenses
F.P. 209 Idaho											
7.22-1 - Ribes Eradication (Methods), Clearwater National Forest	$ 541.70	$ 15.35	$ 557.05	$ 4.45	-	$ 10.25	$ .65	-	-	-	-
7.22-2 - Ribes Eradication (Methods), St. Joe National Forest	347.39	50.64	398.03	26.85	-	-	23.34	-	$ .45	-	-
7.22-3 - Cooperative Ribes Eradication, Coeur d'Alene National Forest	1,419.96	1,149.49	2,569.45	161.98	-	-	100.44	$ 2.65	3.33	$ 660.22	$ 20.[illegible]7
7.2-3 - Developing and Testing Ribicides	14.00	69.48	83.48	-	-	55.40	2.20	-	-	11.56	.30
7.42-1 - Cooperative Ribes Eradication, Clearwater Operation	28,039.55	18,575.17	46,614.72	6,927.02	-	-	204.38	30.93	734.29	10,521.28	157.27
7.42-2 - Cooperative Ribes Eradication, St. Joe Operation	56,162.02	24,465.93	80,627.95	7,874.29	$ .45	-	320.00	27.42	599.79	15,125.21	518.77
7.42-4 - Cooperative Ribes Eradication, Kaniksu Operation	3,035.88	673.04	3,708.92	172.20	37.82	-	129.14	.50	72.82	237.77	22.79
7.6 - Educational Work	560.12	387.00	947.12	.65	-	19.45	8.28	-	-	207.48	151.14
7.7 - Summarization of Field Data	125.00	17.85	142.85	17.50	-	-	.35	-	-	-	-
7.9-(2-4) - Spokane Office Maintenance and Supplies*	637.30	401.40	1,038.70*	-	-	-	17.70	-	28.32	239.79	115.59
Total F.P. 209 Idaho **	$ 90,882.92	$45,805.35	$136,688.27**	$15,184.94	$ 38.27	$ 85.10	$ 806.48	$61.50	$1,439.00	$27,203.33	$ 986.73
F.P. 210 Montana											
7.21 - Cooperative Ribes Eradication, Savenac Nursery	25.50	122.86	148.36	34.05	36.56	52.25	-	-	-	-	-
7.21-2 - Cooperative Ribes Eradication, Cabinet National Forest	673.50	308.33	981.83	57.50	4.65	-	114.85	.25	9.80	116.54	4.74
7.21-3 - Cooperative Ribes Eradication, Kootenai National Forest	874.08	325.19	1,199.27	86.91	4.65	-	52.35	.25	1.48	117.90	61.65
7.6 - Educational Work	-	61.25	61.25	-	-	-	-	-	-	-	61.25
7.9-(2-3) - Spokane Office Maintenance and Supplies*	-	1.88	1.88*	-	-	-	-	-	-	1.50	.38
Total F.P. 210 Montana **	$ 1,573.08	$ 819.51	$ 2,392.59**	$ 178.46	$ 45.86	$ 52.25	$ 167.20	$ .50	$ 11.28	$ 235.94	$ 126.02
F.P. 211 Washington											
7.23-1 - Cooperative Ribes Eradication, Kaniksu National Forest	936.66	268.64	1,205.30	10.44	-	-	10.22	-	4.81	225.67	17.50
7.33-1 - Cooperative Ribes Eradication, Mount Rainier National Park	548.25	43.15	591.40	34.90	8.25	-	-	-	-	-	-
7.9-(2-4) - Spokane Office Maintenance and Supplies*	-	10.90	10.90*	-	-	-	-	-	5.78	4.30	.82
Total F.P. 211 Washington **	$ 1,484.91	$ 322.69	$ 1,807.60**	$ 45.34	$ 8.25	-	$ 10.22	-	$ 10.59	$ 229.97	$ 18.32
F.P. 212 California											
7.15 - Field Studies, Spread of the Rust	2,199.34	2,375.90	4,575.24	930.39	7.45	37.06	214.48	2.75	31.50	1,143.57	8.70
7.2-3 - Developing and Testing Ribicides	456.83	-	456.83	-	-	-	-	-	-	-	-
7.35-1 - Cooperative Ribes Eradication, Yosemite National Park	175.50	-	175.50	-	-	-	-	-	-	-	-
7.45-1 - Cooperative Ribes Eradication, Plumas Operation	674.86	33.75	708.61	-	-	-	33.75	-	-	-	-
7.45-3 - Cooperative Ribes Eradication, Eldorado Operation	676.50	41.34	717.84	38.24	-	-	2.70	.40	-	-	-
7.45-4 - Cooperative Ribes Eradication, Stanislaus Operation	53,482.98	33,825.26	87,308.24	12,183.76	130.79	-	272.54	2.67	877.39	19,657.99	700.12
7.9-(1-3) Spokane Office, Supervision, Maintenance and Supplies*	-	153.24	153.24*	36.00	70.98	-	-	.65	2.47	9.25	33.89
Total F.P. 212 California **	$ 57,666.01	$36,429.49	$ 94,095.50**	$13,188.39	$209.22	$ 37.06	$ 523.47	$ 6.47	$ 911.36	$20,810.81	$ 742.71
F.P. 213 Oregon											
7.44 - Ribes Eradication, Prospect Operation	8,224.66	3,828.48	12,053.14	1,549.25	49.99	255.65	164.99	.70	125.25	1,649.88	32.77
7.9-(2-3) - Spokane Office Maintenance and Supplies*	-	19.42	19.42*	-	-	-	-	-	-	11.85	7.57
Total F.P. 213 Oregon	$ 8,224.66	$ 3,847.90	$ 12,072.56	$ 1,549.25	$ 49.99	$255.65	$ 164.99	$ .70	$ 125.25	$ 1,661.73	$ 40.34
F.P. 128 Oregon (Physical Improvements Allotment)											
7.44 - Ribes Eradication, Rogue River Operation	1,362.30	577.50	1,939.80	476.35	22.49	72.80	-	-	-	-	5.86
7.9-3 - Spokane Office Supplies	-	1.65	1.65	-	-	-	-	-	-	1.65	-
Total F.P. 128 Oregon	$ 1,362.30	$ 579.15	$ 1,941.45	$ 476.35	$ 22.49	$ 72.80	-	-	-	$ 1.65	$ 5.86
F.P. 214 Wyoming											
No expenditures during period of this report.											
F.P. 215 Colorado											
No expenditures during period of this report.											
F.P. 4444 General Expenses, Spokane Office ***											
7.6 - Educational Work	-	415.66	415.66	-	-	-	8.07	-	-	405.[illegible]	1.72
7.9-1 - Supervision	-	43.80	43.80	15.60	27.00	-	-	1.20	-	-	-
7.9-2 - Office Maintenance	1,134.25	232.81	1,367.06	-	-	-	-	-	-	5.02	227.79
7.9-3 - Supplies and Services Paid Under L/A	-	300.63	300.63	-	-	-	53.56	-	6.75	233.42	6.90
7.9-4 - Supplies and Services Paid in Washington, D.C.	-	214.23	214.23	-	-	-	-	-	-	214.23	-
7.9-9 - Spokane Warehouse Maintenance and Supplies	208.50	-	208.50	-	-	-	-	-	-	-	-
Total F.P. 4444	$ 1,342.75	$ 1,207.13	$ 2,549.88	$ 15.60	$ 27.00	-	$ 61.93	$ 1.20	$ 6.75	$ 858.[illegible]	$ 236.14
Grand Total, August 22, 1933 to December 31, 1933	$162,536.63	$89,011.22	$251,547.85	$30,638.33	$401.06	$502.86	$1,734.29	$70.37	$2,504.23#	$51,[illegible].94##	$2,15[illegible].12

*These items carried under General Expenses, F.P. 4444, beginning October 1, 1933.

**Reimbursement will be made to these allotments by the Forest Service to cover the Forest Service share of NIRA blister rust control work on Federal lands which has been paid for from funds of this Division as follows: Idaho, $5,679.22; Montana, $2,135.88; Washington, $561.67; California, $30,789.03. Vouchers for transfers of Forest Service funds in these amounts have been sent to Washington, D.C. for disposition.

#Freight and express still outstanding estimated as follows: $104.49, Idaho; $4[illegible], Montana; $684.95, California; $19.88, F.P 4444; as of March 31, 1934.

##Includes expenditure of $16,810.86 for 23 trucks, ten 1½-ton, eight ½-ton, four pickups, 1 panel delivery.

***Allotment for F.P. 4444 set up in Bureau of Plant Industry October 1, 1933 by deducting five percent from all F.P. allotments, East and West. Expenditures eventually to be prorated over various states on basis of amounts of original allotments.

Annual Report 1933
M. L. McWold

WESTERN CONTROL PROGRAM

Introduction

Blister Rust Control in the West was greatly increased in scope during 1933 by the allocation to this work of approximately 7500 men in CCC camps and by the allotment of NIRA funds. This increase in scope was most timely as the rust is intensifying at a rapid rate in the western white pine area of the Inland Empire, comprising western Montana, north Idaho and eastern Washington, and is threatening the sugar pine stands of southern Oregon and California. The value of work done in the past and adequate establishment of control measures can be ensured only by continuing initial Ribes eradication work on its increased scope and providing appropriations for follow-up eradication work to establish satisfactory maintenance conditions. While the rust has not yet been located in California, the southern limits of pine infection were extended this year and it is entirely possible that the disease may already be established in the sugar pine stands of northern California.

Owing to economic conditions the private operators of north Idaho could not continue to appropriate funds for cooperative blister rust control. Cooperative work was continued with the Forest Service in the expenditure of their allotment for blister rust control from regular funds. Under this appropriation twenty-five 25-man camps were established on the Coeur d'Alene National Forest and nursery sanitation was continued at Savenac Nursery, Haugan, Montana. Funds were available for the Coeur d'Alene operation under the regular appropriation only to the end of August. The Forest Service NIRA appropriation permitted the operation of these camps until October. In addition 350 men were added to the twenty-five camps.

Blister Rust Control in CCC camps was carried on in cooperation with the Forest Service on the normal basis. Six camps were located on the Coeur d'Alene National Forest; 14 camps near Clarkia, Idaho, 9 on the St. Joe National Forest, and 5 on state and private lands and 15 camps in the vicinity of Pierce, Idaho, 10 on the Clearwater National Forest, and five on state and private lands. On August 19 the NIRA appropriation of $1,171,000 to the Division of Blister Rust Control for western work was made available and before the end of August seven 50-man camps had been established on private lands near Clarkia, Idaho, and five 50-man camps on private lands near Pierce, Idaho. Under this appropriation 425 men were placed in 9 camps on the Stanislaus National Forest, California, in addition to the 445 in nine CCC camps operating on the Stanislaus, Plumas and Eldorado National Forests, and in Yosemite National Park.

In addition to these practical control operations the experimental and investigative work was continued as in previous years.

Spread of the Rust

The year 1933 marked a further southward extension of the known limits of pine infection and an eastward extension of Ribes infection in Oregon. While there was no known extension of infection limits in the Inland Empire, this year showed a marked intensification of the rust.

Prior to 1933, 77 pine infection centers had been found in the Inland Empire. Of this number 12 originated in 1923. During 1933, 13 new pine infection centers were reported, one of which originated in 1923. The total known centers of pine infection in the Inland Empire at the end of 1933 was 90, of which 13 originated in 1923. Ribes infection was distributed quite generally over the region. Scouting in the Seven Devils Mountains of west central Idaho and around Brundage Mountain in the vicinity of McCall, Idaho, failed to reveal the presence of the rust.

In Oregon, Ribes infection was found in 12 new locations. Three locations in eastern Grant County represented an eastward extension of known infection limits. Pine infection was located at one point in Marion County and at two different locations in Lane County. The pine infection at Bohemia Mountain in southeastern Lane County represents a southerly extension of the limit of known pine infection. There was no southerly extension of Ribes infection limits.

An extensive scouting campaign in northern California failed to reveal the presence of the rust.

Application of Local Control Measures
Ribes Eradication - Idaho

The 1933 program involved cooperative arrangements between three agencies, the U. S. Forest Service, the Division of Blister Rust Control and the State of Idaho. Owing to the large numbers of ECW camps assigned to blister rust control the State of Idaho deemed it advisable not to spend available state funds until the field season of 1934. Work performed in 1933 is shown in the following summary:

RECORD OF WORK DONE BY ECW, REGULAR AND NIRA CREWS - RIBES ERADICATION
INLAND EMPIRE, 1933

Eradication Type	ECW				Regular and NIRA			Both Combined			
	Acres	Effective Man Days	Ribes	Gallons Spray	Acres	Man Days	Ribes	Acres	Man Days	Ribes	Gallons Spray
Open Reproduction	26,295	33,185	10,015,228		11,330	12,574	3,273,384	37,625	45,759	13,288,612	
Dense Repro.	19,462	11,012	1,432,024		4,183	2,862	362,906	23,645	13,874	1,794,930	
Open Pole	16,412	7,833	1,241,705		10,046	4,747	1,056,177	26,458	12,580	2,297,882	
Dense Pole	2,649	1,037	122,324		2,755	948	163,143	5,404	1,985	285,467	
Open Mature	62,866	28,050	6,408,615		23,606	16,622	3,102,173	86,472	44,672	9,510,788	
Dense Mature	8,156	1,633	323,199		1,580	669	79,324	9,736	2,302	402,523	
Brush	2,928	2,417	309,743		518	1,826	612,985	3,446	4,243	922,728	
Cut-over	8,158	5,545	1,712,853		1,249	1,503	1,150,779	9,407	7,048	2,863,632	
All Upland	146,926	90,712	21,565,691		55,267	41,751	9,800,871	202,193	132,463	31,366,562	
Stream-Hand	17,603	35,673	6,966,369		2,942	6,779	1,772,300	20,545	42,452	8,738,669	
Stream-Chemical	4,997	11,066	-	295,677				4,997	11,066		295,677
Stream-slash	384	5,341	-		186	2,343		570	7,684		
Stream Machine					158	697		158	697		
All Stream	17,987	52,080	6,966,369		3,286	9,819	1,772,300	21,273	61,899	8,738,669	295,677
All Types	164,913	142,792	28,532,060		58,553	51,570	11,573,171	223,466	194,362	40,105,231	295,677

This work was performed on different forest areas as follows:

Clearwater National Forest, Idaho: In 15 ECW camps, ten of which were on National Forest lands and five on State and private lands, initial eradication work was performed on 74,293 acres and first mop-up work on 3,808 acres. In five 50-man NIRA camps initial eradication work was done on 6,328 acres and first mop-up work on 184 acres at a cost of $6.73 per acre. This cost includes 39 acres of slashing work costing $77.61 per acre.

St. Joe National Forest, Idaho. In 14 ECW camps, nine on National Forest lands and five on State and private lands, initial work was done on 64,884 acres and first mop-up work on 1,824 acres. In seven 50-man NIRA camps initial work was done on 11,017 acres and first mop-up work on 49 acres at a cost of $5.92, including 109 acres of slashing work at $76.52 per acre.

Coeur d'Alene National Forest, Idaho. In six ECW camps 20,288 acres were given initial eradication. In twenty-five 25-man camps initial eradication was done on 33,453 acres and first mop-up work on 7,364 acres, a total of 40,817 acres at a cost of $4.55 per acre. In addition, 158 acres of stream type were cleared by a bulldozer at a cost of $44.57 per acre.

Washington

Work was continued on Mount Rainier National Park by men detailed from ECW camps. The Division of Blister Rust Control supplied one unit supervisor and the National Park Service furnished four foremen experienced in blister rust work. Initial eradication was performed on the Muddy Fork of Cowlitz area and reeradication on the White River area, as shown in the following table:

RIBES ERADICATION, MOUNT RAINIER NATIONAL PARK
1933

	Area	Type	Acres	Man Days	Ribes	Per Acre Ribes	Per Acre M.Days
Eradication	Maple Creek	Stream	27.1	564	23,399	863.4	20.10
Reeradication	White River	Stream	465.0	688	38,870	836	1.48

Oregon

Ribes eradication work was carried on in the Rogue River drainage in two 25-man NIRA camps. No control work had been done in this region since 1925 when Ribes were eradicated from 1,834 acres. Control operations were continued in 1933 on areas adjacent to that worked initially in 1925. Some portions of the 1925 area were reworked. Results of this work are shown in the following table:

RIBES ERADICATION ON THE ROGUE RIVER NATIONAL FOREST

Type	Acres	Man Days	Total Ribes	Total Cost	Per Acre Basis Man Days	Per Acre Basis Ribes	Per Acre Basis Cost
Open Reproduction	406	191	25,123	$1,362.24	.47	62	$3.36
Dense Pole	202						
Open Mature	4,704	512	85,311	3,651.66	.11	18	.78
Dense Mature	90						
Meadow and Brush	85	74	37,400	527.78	.87	440	6.21
All Upland	5,487	777	147,834	5,541.68	.14	27	1.01
Stream	526	497	136,168	3,544.68	.94	259	6.74
All Types	6,013	1,274	284,002	9,086.36	.21	47	1.51
Stream *	129	129	5,162	920.05	1.00	40	7.13
Total	6,142	1,403	289,164	$10,006.41	.22	47	$1.63

Dense pole, dense mature, and approximately 2,500 acres of open mature types were Ribes free. This acreage included in the above summary.
*Rework of area worked initially in 1925.

California

Ribes eradication work was carried on by 445 men in 9 CCC camps on the Plumas, Eldorado and Stanislaus National Forests and Yosemite National Park and by 425 men in 9 NIRA camps on the Stanislaus National Forest. Results are shown in the following summary:

RIBES ERADICATION WORK IN CALIFORNIA, 1933

	Class of Work	Acres	Man Days	Ribes	Per Man Day Ribes	Per Man Day Acres	Per Acre Ribes	Per Acre Cost
CCC	Initial Eradication	12,491	12,021	2,173,808	181	1.04	174	
CCC	Reeradication	5,900	3,020	188,406	624	1.95	32	
	Total	18,391	15,041	2,362,214	157	1.22	128	*$4.75
NIRA	Initial Eradication	21,324	13,071	3,298,975	252	1.63	155	3.56
	Total or Average	39,715	28,112	5,661,189	202	1.41	142	

*Estimated

The average man day cost of the NIRA work amounted to $5.81. On the basis of 15,041 eight-hour man days of CCC labor, the hypothetical cost of the CCC work is $87,394.78 or $4.75 per acre. It is estimated that the production of NIRA crews, for areas averaging 17 percent more Ribes and on which working conditions are more or less similar, is greater than CCC by 38 percent for Ribes eradicated and 25 percent for acreage covered and costs. This comparison is based on an eight-hour day for each. The NIRA crews actually worked an eight-hour day while the work day of CCC men averaged 5.3 hours.

Checking Efficiency of Ribes Eradication

Checking work was performed on all Ribes eradication projects in Idaho, Washington, Oregon and California on the basis of a 4 per cent strip check in upland types, and from 8 to 50 per cent check in stream types. The standard of satisfactory work in 1933 allowed only 25 feet of live stem per acre to be left on an area. Having a checking organization on the ground insured the establishment of a satisfactory condition of control; any area which did not measure up to a satisfactory standard was reworked and checked again after being reworked.

The checking organization also assisted in speeding up the work, and reducing cost by running advance check strips which resulted in eliminating comparatively Ribes-free areas from the acreage to be worked.

Control Reconnaissance and Preeradication Survey
Montana

Preeradication surveys were completed on 46,855 acres on the Cabinet and Kootenai National Forests at an average cost of $.012 per acre.

Idaho

In the late fall of 1933 preeradication surveys were completed on 485,605 acres at an average cost of $.012 per acre. Preeradication acreage in Montana was included in computing average cost figures. 40,000 acres on which preeradication work was performed on the Coeur d'Alene National Forest were not included in computing costs; only 8,350 of these 40,000 acres representing white pine type were included in total preeradication acreage figures.

Oregon

Preliminary survey work was done on 274.560 acres at an average cost of $.0094 per acre.

California

A preeradication survey was made on 340,158 acres on the Plumas, Eldorado and Stanislaus National Forests. Control reconnaissance was conducted on 64,379 acres in Yosemite National Park and on the Stanislaus National Forest.

Nursery Sanitation
Montana

Ribes eradication was continued at Savenac Nursery within the nursery quarantine zone extending one mile in all directions from the cultivated area of the nursery. 193,011 Ribes were pulled on 1,763 acres. Several small areas of concentrations of *Ribes petiolare* amounting to 10.4 acres, were sprayed with chemical. The average cost of eradication work was $2.41 per acre.

Cutting and piling of brush was necessary on Big Creek and Upper St. Regis blocks on account of dense brush and alder patches. In addition, cutting

and piling brush was done by CCC men for one mile along Savenac Creek adjacent to the Nursery. Besides benefiting the control program this work prepared the land for possible nursery expansion.

Control Investigations

A. Eradication

1. Brush Removal: Studies in eradication methods were largely confined to brush removal. Experiments in 1932 with a special bulldozer blade for brush removal demonstrated that a closed frame containing digging teeth was not practical. In the spring of 1933 a brush rake was built having solid heavy teeth on an open frame which allowed the wet soil to fall away from the roots of the plants. During the field season of 1933, 158 acres of stream type on the Coeur d'Alene National Forest were cleared by the bulldozer method at a cost of $44.57 per acre. Burning done on 51.25 acres included in the above total cost an additional $8.85 per acre.

B. Development and Testing of Ribicides

A recheck of 1932 experimental plots in June showed a marked superiority of ammonium thiocyanate over sodium chlorate for the destruction of *R. inerme*. A check in the late summer however showed that the use of sodium chlorate in dosages varying from 2,500 to 5,000 pounds per acre resulted in delayed injury the season after application. This effect is almost entirely absent from ammonium thiocyanate. A study of soil samples from 1933 plots for determination of residual thiocyanate showed that 85 per cent of the 5,000 pound per acre application had disappeared from the first foot of soil. There were only traces of ammonium thiocyanate in the surface six inches of soil of the 1,000 and 2,000 pounds per acre plots. Plot studies of the relative merits of sodium chlorate and ammonium thiocyanate were continued. Applications of various amounts of each chemical were made on plots at Clarkia, Idaho. Definite results cannot be determined until next year.

Root studies showed that *R. petiolare* as a general rule is more deeply rooted than *R. inerme*, though *R. inerme* roots have a greater lateral spread.

Copper sulphate and sodium fluoride were applied to mutilated crowns of *R. viscosissimum* bushes after cutting off the plants as close to the crown as possible. Chemical was applied at the rate of three to four ounces per crown after the cut tissue had been moistened with water. This method has interesting possibilities as an auxiliary to upland hand pulling eradication as a late season check indicated that this method is 100 per cent effective.

Laboratory investigations have been continued on minimum dosage of chemicals for a satisfactory killing of Ribes. A method has been devised for the qualitative determination and extraction of small amounts of sodium chlorate in the presence of plant sap.

C. Studies in Ribes Ecology

1. Idaho. Field investigations were concentrated in those areas where

a selective type of logging on a sustained yield basis had been practiced to determine any possible influence of such logging practice on the upland species of Ribes. In an area which has been logged in such a manner that a partial canopy has been allowed to remain, the percentage of survival of such Ribes seedlings as do make their appearance is not great. By delaying eradication on such areas for two or three years following brush burning nature could be depended on to do more than two-thirds of the eradication. Added to this is the fact that at some later time the surviving seedlings would be of sufficient height to make their eradication manifestly easier.

Regardless, however, of whether eradication is delayed or whether it is conducted immediately following brush disposal, the fact seems evident that a type of cutting which insures a minimum amount of ground disturbance, caused either by the logging operations or by burning, and which leaves the area with a sufficient canopy has made unnecessary the actual pulling of hundreds and in some cases thousands of Ribes per acre. In other words, it appears certain that R. viscosissimum can be partially controlled by cutting methods.

Any regulations drawn up for the future administration of white pine stands of north Idaho should take cognizance of the close relationship which seems to exist between the manner of treatment of a stand and the resultant R. viscosissimum population. The vast stands of timber in this region of the northwest exist as potential breeding grounds for the secondary host of white pine blister rust only awaiting the saw and fire to release them from their temporary period of harmless inactivity. Proper logging methods can minimize these hazards.

2. California. Ecology work consisted in a study of plots established in previous years. These studies indicate that in stream type Ribes seedlings begin to appear the first year following logging, reach a maximum the second year and then gradually decline though some germination of seedlings may take place up to the fourth year. On cutover land in a sugar pine-fir type the number of seedlings is greatly enhanced and a greater number of bushes will be present where eradication does not take place until three or four years after logging. Heavily fruited bushes leave a large quantity of seeds which reach a maximum germination the third year after eradication and then decline. Ribes seeds tend to repose in mineral soil, or at least germinate there more readily than in the top and second layer of duff. Viable seed, however, were found in the top loose layer of needles and in the middle layer of duff. Shading out by brush on a logged-off area not eradicated has not caused a marked decrease in the number of bushes over a ten-year period.

D. Field Studies of the Rust

1. Pine infection Studies.

(a) Newman Lake, Washington

Only 14 cankers of a total of 2,217 on the plot can be attributable directly to the infecting power of Ribes lacustre, having their origin after 1928. 1,508 of the 2,217 cankers were dead in 1933. There has been a

decided decrease in fruiting cankers on the plot, 1,031 being found in 1931, 274 in 1932 and only 144 in 1933. Infection on R. lacustre was light in June of 1933, whereas in 1931 and 1932 approximately 20 per cent of the bushes were infected. In July and August the percentage of bushes infected had increased to a sufficient degree to equal infection conditions of 1931 and 1932. Correlation of weather data with infection conditions showed that this situation was due more to climatic factors than to the number of fruiting cankers and consequent aecial production.

2. Effectiveness of Control Studies

(a) The Growth and regeneration of Ribes in stream type following Ribes eradication.

Of 247 plots established in 14 drainages 178 have been selected for annual study. Results of this year's study show that initial Ribes eradication reduced an average of 38,338 feet of live stem per acre to 1,372 feet, a 96.4 per cent reduction; second eradication reduced an average of 2,428 feet of live stem to 621 feet, a 74.4 per cent reduction; in 28 of 30 cases where there was no post eradication disturbance, there was an annual increase in Ribes live stem following Ribes eradication; the average Ribes live stem increment was 51 per cent; seedling live stem constitutes approximately one quarter of the total live stem of the area by the fourth year after eradication; no flowers nor fruits have been noted on Ribes seedlings which developed after eradication including four-year-old plants.

(b) The influence of stream type Ribes eradication on canker intensification.

From preliminary studies it is found that for unworked areas new cankers comprised 93 per cent of the total, and for the worked areas 43 per cent of the cankers were new cankers originating since eradication. This 50 per cent reduction resulted from the removal of Ribes live stem to a point where an average of not less than 100 and not more than 3,400 feet per acre was present during each year since eradication.

If Ribes are removed to a limit of 25 feet per acre, it appears that eradication to this point will almost control the rust which is true if only the 25 feet of live stem per acre be considered. If the average annual Ribes live stem increase, however, is 51 per cent, the 25 feet compounds to more than 100 feet of live stem in four years, and over 1,000 feet in nine years. Therefore, in order to capitalize on initial eradicative efforts, it is imperative that timely and adequate maintenance eradication be planned in order to keep the Ribes population down to a point where pine losses will not be excessive.

Informational Work

Informational activity was continued with blister rust and Forest Service personnel, educational institutions and the general public. Photographic work was increased to a great extent and furnished definitely improved service to the control operations. The scope of aerial photography in cooperation with the

116th Photo Section, Washington National Guard, was increased. Mosaic maps and oblique photographs proved to be of definite value in eradication and preeradication work. A good deal of drafting work on maps has been obviated by the use of enlarged photographs which have been produced at a saving to the Government.